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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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## EDITORIAL NOTES.

### 1863-1913.

A FORTNIGHT from to-day, and the proceedings at the Jubilee Meeting of the central professional organization of the gas industry will have commenced to add fresh pages to technical gas history. It may be predicted with confidence that, on this occasion, there will be several glances—particularly in the Presidential Address of Sir Corbet Woodall, D.Sc., M.Inst.C.E., at the time of the presentation of the portrait in oils of Mr. Thomas Newbigging, D.Sc., and at the dinner, when several guests will be present from high place in this country, and from abroad—through the chapters that are the records of the industry in the now silent past, but the potent and material work and influences of which past live. Those who will be the guests of the Institution of Gas Engineers on this occasion of rejoicing and celebration will be heartily welcomed in our midst; and those whose identity with the industry has not been of such close nature as to make them fully cognizant of the extent of its relations with mankind will hear of a history that is almost romantic in the matter of increase in service, prosperity, and strength in its every part, in the face of ever-enlarging and keen competition. They will hear, too, how the prosperity of the industry has extended the borders of other industries, and how it has opened up new industries to the general advantage of the whole country. This is as things should be in a country that can well claim to be the motherland in the matter of organized gas supply.

In times of such feverish activity as these, looking back is not perhaps such a profitable occupation as looking forward. Yet we do not envy the men whose thoughts and days are so monopolized by the present and future that they cannot occasionally spare time, find interest, and obtain an invigoration of intellect, by exploring the roads along which their predecessors have passed, and which have brought to its existing magnificent state the industry which gives them scope for useful occupation and reward. We must have knowledge of the past, if for no other reasons than that we may profit by its experiences in successes and failures; that we may be safeguarded from wasting time, money, and ability in re-traversing roads that have already been sufficiently trodden, and in regard to which all has been found out that it is profitable to know. Over and over again we have seen, in the course of technical development here and there, things put forward as new which have not been new, and upon which time and money have been freely expended, and ability exercised, that might all have been saved, if there had been a little research into the doings of the past. Many a thing that has been brought to success under modern conditions has had antecedent origin in suggestion, if not always earlier materialization and introduction into beneficent service. Those who are the best workers in the industry's affairs, those whose service bears most fruit, are those who have a fairly clear knowledge of what has gone before in the particular lines of work that they, by aptitude and inclination, make peculiarly their own. The gas industry has a great historic past—technically, commercially, and in its service to mankind. The Governor of to-day of the first statutorily controlled gas concern in the world will probably speak of these things when he addresses the members of the Institution on the 17th inst.

However, when on Dec. 15, 1863, two dozen professional men of the gas industry met, with the approval of a still greater number of men in professional occupation in the industry, to consider the question of the formation of the British Association of Gas Managers, the period was then for the industry, comparatively with these times, a humdrum one. Yet those men felt the need of organization and conference; and they were right. Look back at all that has transpired since then—it makes an aggregate nothing short of remarkable and magnificent. Yet what has transpired through the past five decades is—mark this!—what lay, though unseen, before those men who took the preliminary steps in the formation of a central professional gas organization. We honour them for their labours in strengthening the foundations of the industry, and for their developing work according to their opportunities. They wrought well and robustly. With all, however, that has been done during the fifty years that have elapsed, we cannot now say that in any one line of the industry's work and service perfection has been reached. It may be that fifty years hence things will have progressed to such an extent that our successors who will be celebrating the centenary of the central organization will regard as comparatively small what to-day we look upon with pride as great. We cannot predict the future from the past. The roads of development have been opened up at greater rate in the second moiety of the fifty years than in the first; and all we can say is that never was promise brighter. We have had it, in an enhanced degree, impressed upon us by progress how new developments produce further developments. Evolution is continuous in the industry; and the unfolding of each fresh success in the manufacture, distribution, or application of any one of the industry's commodities, only means an extension of the area from which additional development may break. That is what has happened in connection with the industry's affairs in the past; it is what is happening in the present; and it is what will happen in the future. The meridian of prosperity is still afar off.

We are looking back. We glance at the list of names of those who were present at the birth of the central organization on that December day half a century ago. Many—yes, most—of those men have "crossed the stream" into the great unknown; the sons and grandsons of some of them hold honoured place in the industry to-day. Some of those who were original members of the first national gas organization are still with us. We honour them as we honour the memory of their contemporaries and seniors who took part in the formation of the old British Association. Those who are with us now, who were working in the cause of the industry fifty years ago, and who are watching what is now being done, must find a quickened coursing of the blood through their veins as they witness the vitality of their old industry everywhere, notwithstanding the vast ramifications and intricacy of its affairs compared with half a century ago. And of the many who have gone hence? Some made for themselves illustrious names; some by their work made great impression upon the industry's fortunes, and added lustre to its fame. Others laboured faithfully according to their opportunity and ability. But to all of them, whatever their lot and part, the gas industry is to-day a stable memorial. The memory and the work of these professional forefathers who have gone, or who have relinquished their active part, we cherish; and as their good works amid early limitations are remembered, they will more and more energize those who have succeeded them in a persistent effort to make the industry stronger and yet stronger by building well from luxuriant opportunities not even conceived, let alone in the inchoate state, fifty years ago. Those opportunities lie around us as the jubilee of the foundation of the central organization is being celebrated, and of what some of those opportunities consist will be demonstrated when the celebrations are renewed during the autumn, by the holding of the National Gas Exhibition at Shepherd's Bush.

The complete history of the whole of the fifty years of the technical and commercial life of the British gas industry is only to be found in the pages of the "JOURNAL;" and, this being so, we may be forgiven making, on such an occasion as this, reference to the matter. When the founders of the British Association of Gas Managers met fifty years ago, the "JOURNAL" was then fifteen years old; and from that preliminary meeting the whole of the records of the central and other technical organizations have been duly kept in our

pages. It is a long history, and a large and an interesting one. The subject-matter of that history has constantly expanded, ever and again unfolding to view fresh and profitable discovery, which has made the industry what it is. Fifty years ago the channel of communication that the "JOURNAL" formed between all parts of the world's gas industry was kept, covering a whole year, within the limits of 804 pages. Four times that number of pages would not now satisfy the demands in any one year; and the quietest three months of any year now send out a volume of larger bulk than the annual volume of fifty years ago. This reflects the enlargement of the field of which survey has to be made; the enlargement of the field, the enormous development of prosperity. As the position and prospect are viewed, there is good cause for rejoicing on the part of the gas industry at this time of the jubilee of the establishment of its central technical organization.

## Report of the Institution Council.

THE report that has been prepared by the Council for presentation at the Jubilee Meeting of the Institution (the programme for which is published in other columns) is one that is worthy the occasion. With the accounts, the material comprises in it covers, very appropriately for a jubilee, fifty pages. There are small parts or points in the document which are open to criticism; but it would be hypercritical to deal with them when there is so much else that is good. Of course, much appearing in the report is not now news; but it is only proper that the Council should amass, in their annual statement of their proceedings, those matters upon which they have already published information together with the new matter summing up the work with which the Institution are identified. Here we may pass over personal matters, awards for papers (by the way it is noticed the bronze medal has not been allocated), and the plan of the Council for economizing the time of the annual meeting, by the distribution of papers beforehand, and not reading them *in extenso*. On this last point, however, comment is made in another article.

Educational matters are brought well to the front of the report of the Council. The facts related in connection with the examinations in "Gas Engineering" and in "Gas "Supply" may be taken as a fair indication of the growth of a desire on the part of the young men who have decided to devote their energies to the gas industry to make themselves more and more proficient in its technical work. It is therefore exceedingly satisfactory to learn from Mr. Thomas Glover and Mr. Walter Hole, the Examiners in the respective divisions, that the number of candidates shows a considerable increase over the previous year. Mr. Hole particularly must have had his energies severely taxed by a flight in the number of "Gas Supply" candidates from 407 to 538. This indicates the growth—and it is a very gratifying indication—of an appreciation of proper qualification for appointments in the distribution department, which, as year succeeds year, holds out still greater prospects for lucrative appointment for young men of adequate knowledge. In regard to the education and certification of gas-fitters, the representation of the Council to the City and Guilds of London Institute that there should be certification without written examination was abortive. We hardly thought that it would be otherwise. The City and Guilds of London Institute is not to be easily moved to alter custom, and make an exception for any one class of students; and perforce the Council have had to accept the situation. There was no option, as non-acceptance would have meant the further setting back of the project, and the loss, in the attempt to advance it, of the organization and machinery of the City and Guilds Institute.

At the same time, the reason put forward by Sir Philip Magnus, M.P., against making an exception in this case savours more of pure conservatism than of legislative elasticity in meeting the special case submitted to him by those who know the men whose instruction they desire to enhance in the interests not only of the gas industry but of the public. Sir Philip cannot understand why the Committee who have had this matter in hand are so afraid of taxing the intelligence of the students. It seems to him that any practical work, such as that which gas-fitters are required to undertake, would be better done, with greater safety to the public, by men showing a certain amount of intelligence than by those who are merely good craftsmen. The argument gives the opposite case a coating of theoretical truth; but long experience produces some very practical truths from the other side. We are not condemning examinations generally. But there are many men who can show the intelligence (upon which so much weight is placed by Sir Philip) necessary to obtain a certificate by examination who are not good craftsmen. We would sooner in gas-fitting do without the highly intelligent and clever examination-paper man who is not a good craftsman, and have the intelligent and good craftsman who might find it difficult to sit down to the (for him) ordeal of putting into writing the replies to even an elementary paper. The suggestion of Sir Philip, that at first elementary questions should be put, with an after gradual raising of the quality of the questions, does not appeal to us as a good means of testing, for certification, the qualification of a gas-fitter. We should infinitely prefer to see him at practical work, and certify on the quality and resource he displays in doing his work. There is another point, the examination paper may act as a deterrent to many good men seeking to obtain certification; and this would indeed be a pity.

Research work forms in the report of the Council, or promises to form at the meeting, an interesting feature. No great expectation can be held forth as to the Carbonization Committee presenting anything useful. We hardly know what to make out of this Committee; and perhaps it would be as well to disband the members for a period rather than allow the body to continue to exist in a state of "sus-"pended animation" for a further series of years, unless, of course, there is a surprise in store for the coming meeting. The Refractory Materials Committee, on the other hand, have generally something interesting and progressive to relate; and, at the meeting, there is to be some useful information submitted, as the result of research by Dr. Mellor, on the point as to how far the retort material produced by the manufacturers complies with Section I. of the Standard Specification. Bearing further on carbonization, research into its problems is of paramount importance; and so we are pleased to see that Professor John W. Cobb (Livesey Professor) is directing the work of Mr. Harold Hollings, B.Sc., the present holder of the Institution Research Fellowship, into very practical channels. There are lines of research that, in the initial stages, must be prosecuted in the laboratory before they can be pursued under working conditions, in order to secure guiding laws. It is new work that Mr. Hollings is conducting, under Professor Cobb's supervision and direction. It treats of the thermal behaviour of coal during distillation. It is obvious that the varying physical constitution of coals must produce a varying heat conductivity in them, with varying results. The investigations have been commenced; and they are to be carried on not only on the first lines, but along others—for example, to ascertain with more exactitude the effect of hot surfaces and radiant heat on the distillation products, and the effect on the various products of their passage through incandescent coke. There ought to be much valuable information derived from this research. The preliminaries of another practical inquiry are in hand at the Leeds University; the subject being the natural ventilation of rooms heated and lighted by gas. The reference to the Leeds University enables allusion to be made to the organizing work that has been proceeding quietly, under Professor W. A. Bone, in the Engineering and Chemical Department of the Imperial College. A complete experimental plant has been installed; and the department is now ready for the reception of students of fuels and refractory materials. The work that is to be conducted here is in no sense in antagonism to the Leeds University; but it is proposed to work on parallel lines, and to offer facilities to students who, being in London and the South of England, cannot avail themselves of those provided at Leeds. The sympathetic co-operation of all gas engineers in and about London is sought by the College authorities.

There are several other matters treated upon in the report of the Council with which readers are acquainted—such as the proposed enlargement of the International Commission on Photometry, the standard specification for street lighting, and the successful result of the opposition to the attack on the gas industry of the chemical manufacturers. Report is also made regarding the question of depreciation allowance in respect of income-tax, as well as on the decisions affecting gas-works of the Umpire under the Unemployment Section of the National Insurance Act. The report is well worth preservation, if only for reference on these last two matters. The accounts appended to the report are highly

interesting, particularly those dealing with publicity and the British Commercial Gas Association. Touching on the question of finance, there will be general agreement with the Council in concluding that the present is a most inopportune time, with the National Gas Exhibition to finance, to consider a scheme for a central home for the gas industry. This is a matter that has been revived recently; but it is quite an ancient one in our columns—the last occasion it was introduced as a suggestion being at the time of the discussion of the projects for a memorial to Sir George Livesey. The idea was not then, nor was it previously, generally well received. But our feeling has been constant that it is a mistake for a great industry like that of gas manufacture and supply not to possess a central home of its own. Of the usefulness of such a place, with the various organizations in existence, there can be no two opinions; of the value of such a place in creating impression, comparatively with two or three small rooms as offices, and sometimes reliance upon the goodwill of other societies for accommodation for meetings, there can again be no question. But it would be impolitic to make any serious move in the matter—at any rate, just at the present time. What might be a success later on would be a certain failure now.

## A Model Clause Absurdity.

The Presidential Address that Mr. T. E. Franklin, of Barry, delivered to the members of the Welsh Association last Wednesday was a chatty production on various matters of current interest; and, generally speaking, in regard to those subjects, Mr. Franklin expresses views and opinions that are immune from dissent, because they are of the common-sense order. But it has fallen to Mr. Franklin to point out to our legislators, parliamentary lawyers, and the gas industry, the absurdity of the wording of the model service-pipe clause, which has been adopted by many undertakings, and probably, before it is modified, will be adopted by many more. But while we look upon the clause as a perfect absurdity in its present form, it is also easy to pronounce it as one of the most harmless of parliamentary enactments; and yet we are not at all sure that the parliamentary authorities have made what they regard as any mistake in the matter, whatever others may think of it. That, from the parliamentary authorities' point of view, there is no error in section 1 of the clause is seen by the confirmation in sections 4 and 5. In drafting the clause, they have given both the consumer and the gas supplier some control over what is done on the consumers' premises up to the meter—nothing more. What, however, Mr. Franklin thinks the clause does is to give the consumer the right to lay his own service-pipe between the gas suppliers' main and the meter. It really does nothing of the kind. It only gives him the right to do so, on certain protective conditions for the gas suppliers, within the limits of his own premises. He cannot go an inch outside his own premises, nor make connection with any gas-main external to his premises.

Just see what the first section says: "The Company may "specify the size and materials of the pipes, with the fittings "thereof, which are to be laid by the consumer *on his own premises* . . . . between the company's mains and the "meter, so far as such pipes are intended to be covered over." Then by another section it is prescribed that the meter is to be placed as near as is reasonably practicable to the suppliers' main, but within the outside wall of the consumer's building. And, further, the gas suppliers have the right of inspection, within a certain time, to see that there has been full compliance with their specification of the work to be done, on the consumer's "own premises," between their (the suppliers') main and the meter. That is not such a frightful matter from the gas suppliers' standpoint. Their interests are well protected. First there may be specification by the gas suppliers of the size of the pipes and materials to be used. If the gas suppliers do not take advantage of this, in the event of the consumer being foolish enough to want to bear the expense of doing the work, then it is their own fault. Then the consumer is not authorized to do any work outside his own premises; and therefore, as gas-mains are laid in the public ways, the consumer cannot put in the connecting link. Moreover, if the suppliers' main ran close to the limits of the consumer's property, the clause does not give him any right to interfere with the suppliers' property, or to make connection with it. Then there is the subsequent inspection by the gas suppliers before the work on the consumer's premises is covered in. Up to the present time, although the clause has appeared in many Acts, we have not heard of any consumers who have been desirous of saving the gas suppliers' capital or renewal expenses by laying or relaying, to the gas suppliers' specification and under their supervision, the portion of the service-pipe on the consumer's own premises. We do not suppose we shall ever hear anything of the kind, nor ever have the opportunity of congratulating gas suppliers on the benevolence of their consumers in this respect. It is not a habit of gas consumers to render monetary assistance to gas suppliers, on terms laid down by the latter, if they can possibly avoid it.

There is another point in this connection; and it is that gas suppliers need not, unless they choose, adopt in their Bills such a clause as the one in question. They can simply leave it alone. We know that it is somewhat of a custom of Parliamentary Agents to insert in Bills clauses that are in the Model Clauses if their clients are not already in possession of the powers; and sometimes they do this without any consideration as to whether, under the local circumstances of the concern, the clauses are really useful or necessary. We have often come across model clauses inserted in Bills that are never likely to be required by the promoters in their particular circumstances—at any rate, not before changed conditions necessitate an appearance in Parliament again—and sometimes these very clauses have been the ground of opposition, and even amendment. There is no necessity to adopt the clause, harmless as it is, to which Mr. Franklin calls attention; but, at the same time, the parliamentary authorities would render it more useful and protective to the public if they made it apply to pipes and fittings after the meter, instead of to the service-pipe on the consumer's own premises before the meter—the meter being the point to which the gas suppliers deliver the gas under the ordinary conditions of supply, and at which the consumer becomes responsible for payment for the quantity of gas that he uses.

## Oven Chambers in Small Works.

Greater attention is being paid in this country to the question of the use of chamber ovens for the production of gas. Where, as at Birmingham, coke of the metallurgical variety has a good sale, there is a consideration apart from any others that may be advanced for the adoption of such ovens. It was seen in our news columns last week that Darwen has a scheme in hand for the adoption of Munich chamber ovens; and now at the Welsh Association meeting last Wednesday, Mr. Ernest A. Franks, of Ferndale, described how he is daily having satisfactory experience of an installation of half-a-dozen ovens in his small sphere of operations. This is one of the most interesting applications of the chamber-oven system that we have yet come across, owing to the small size of the works. Experience such as that Mr. Franks submits will go a long way towards exploding the old-fashioned idea that the new retort systems, and even bulk carbonization, are not for small works. Mr. Franks makes a very plain statement, though we should like to have seen a few blanks filled up. He has a market for such coke as is produced from chamber ovens having an average capacity for $2\frac{3}{4}$-ton charges; and coal is so cheap in his neighbourhood that he has not much of a domestic market. There are three other considerations that induced him to adopt the system. In the first place, he wanted to reduce labour, without mechanical means. In this, he has succeeded. He also desired to get a larger carbonizing capacity on to his limited ground area. In this, again, he has succeeded. He also wanted to get his wear and tear charges down to a low point. About this we must await further intelligence. When chamber ovens for gas making were first introduced on the Continent, the weight and the bulk of charge, and the variable stresses on the structural parts during the period of carbonization, caused trouble, and a fairly considerable expenditure for wear and tear; but more recent information has shown that experience has produced quite a different order of things in well-constructed settings.

Mr. Franks finds greater flexibility about the six chambers (three to each furnace) than he first of all expected; and under systematized working he can now get them to meet his requirements precisely. It is impossible to speak too definitely of, or to be too critical over, figures derived from a comparatively small-scale works, where the men are often engaged on other work than that forming their chief occupation. But the cost of 0·94d. per 1000 cubic feet given by Mr. Franks for "stoking" is one that some much larger gas-works which we know might well envy. The make of

gas (10,760 cubic feet) is no doubt good for the Rhondda coal used; but there is no mention whether the illuminating power of 14·1 candles was the result of a test by a No. 1 or a No. 2 burner. In this test, which occupied eighteen hours, three chambers being charged successively every six hours, samples of gas were drawn-off every hour during the last six of the eighteen—this probably being done to secure typical examples of the gas yielded in ordinary working. In order to secure a fairly uniform quality, it is necessary to have this overlapping of the charges, as, from any single chamber oven, there must be considerable variation in the quality of the gas between the early and the later hours of the eighteen or twenty-four, according to the working. However, the analyses show that the composition of the gas during the six-hour period taken—when one oven was on its last six hours, the second on its intermediate six hours, and the third on its first six hours—was throughout fairly uniform. Looking at the figures, we should like to know whether a calorimetric test was taken, and what was the result. Mr. Franks has struck out a distinct line for himself under his local and somewhat straitened circumstances in regard to ground space and holder capacity; and we congratulate him both upon his courage and the success that has ensued. The discussion on the paper did not disclose any very serious criticism.

## An Institution Mistake.

THE project of the Council of the Institution to economize time at the forthcoming meeting by only having abstracts of the papers read, and utilizing the time so saved in discussion, is likely to prove an utter failure unless a mistake that has been made, in the matter of the prior distribution of the papers, is at once rectified. A condition precedent to the effective consummation of the project is that each member should receive, in good time before the meeting, a complete set of the papers. But what are the Council doing in this matter? For some reason best known to themselves, they have issued a circular to the members asking each recipient to return it to the Institution office with a mark against the titles of the papers (if any) that he requires, and at the same time to indicate by initials the papers on which he desires to speak. Various members have brought the circular to our notice, and have made remarks far from complimentary upon the singular method adopted of trying to attain the end in view. How can a member possibly judge whether he will be prepared to take part in any discussion merely from a consideration of the title of the paper? Or how can he discriminate from the titles whether or not there is matter in the contribution that will be of interest to him? The Council are either trying to carry economy a little too far, or they are unconsciously making it as difficult as they can for members to assist them in ensuring a success of the project for enhancing the value of the time at the sittings. Unless some change is promptly made in this matter, the office of the Institution will find itself in an awkward predicament. Some members, we know, are proposing, as a protest against the circular, and to safeguard themselves, to place an affirmative mark in both blanks provided next to the titles of the papers, or to make some evasive note. Every member, under the proposed arrangement, is surely entitled to a complete set of the papers; and the only sensible and proper course would have been (the additional expense would not have overwhelmed the Institution) for the Council to have had a copy of all the papers sent to each member, accompanied by a circular asking for an intimation before the meeting as to which, if any, of the contributions the recipient desired to speak upon. Then the members would have been in a position to have formed a decision, and to have assisted the Council in giving good effect to their plan for enabling the whole of the papers to be properly discussed. As it is, the circular asking members to indicate, on a consideration of titles only, the papers they desire to discuss, has aroused much ridicule. Is it too late to rectify the serious mistake? We think not—at any rate, we hope it is not for the sake of the meeting, and that of the project. If something is not done, the prospect is that the trouble of previous years will be intensified, instead of moderated.

### National Gas Exhibition Fund.

Our readers are aware that the Organizing Committee of the National Gas Exhibition, to be held next October, have estimated that £25,000 ought to be expended in order to produce a display and advertisements that will attract the public and the public newspapers. When the last report of the Committee was issued, £4000 was still required to complete the half of the funds that should be furnished by the gas undertakings of the country—the members of the Society of British Gas Industry having practically guaranteed their moiety. In a foot-note to a reference to the matter in the report of the Council of the Institution of Gas Engineers, it is stated that the £4000 balance has been reduced to £2700. This looks healthy. There are numerous gas undertakings, we are sorry to say, still outside the list of subscribers. If they would only come in, and subscribe this amount between them, all anxiety regarding a sufficiency of funds would be removed from the shoulders of the Committee, who represent all branches of the industry, and are devoting themselves unsparingly to the organizing work. Nevertheless, as time progresses, the preparations for the unique exhibition are shaping well; and the enthusiasm of those on whom the work is falling is progressively rising as fresh backing comes from the industry. Their encouragement has been great; but they want all they can get, for they have embarked on a project the like of which has never been touched before as a demonstration of the utility of gas in all the branches of its application. Let gas undertakings oversubscribe rather than under-subscribe; for the intention is the commercial one—to compel public attention.

### Gas Engineers and Motor Fuel.

As consideration must precede action, attention may be directed to the letter of Mr. Henry L. Doherty, of New York, that appears in our "Correspondence" columns to-day. Mr. Doherty is largely interested, professionally and otherwise, in the American gas industry; and when he recently visited this country, he was struck by the work being prosecuted—in view of the market position of petrol and the clamant call of the motor-car industry for an alternative motor spirit—to increase the sources and production of benzol. He entered into the matter; and, as our columns have recently shown, he came to the conclusion that gas undertakings offered, through the washing of their gas for the extraction of benzol, the shortest cut to meeting the difficulty. As we have already pointed out, gas undertakings are not their own masters in this matter. They have parliamentary obligations with which to comply; they have consumers to consider; and they have to look at the matter as a commercial proposition. Those are points recently discussed in these columns. Mr. Doherty does not regard them as insurmountable; but, of course, he is not so well acquainted with the obstinate character of our Legislature as we are at home when gas undertakings think fit to ask for a fresh change in the foundation of their obligations, and all considerations are in favour of the change. However, as we say, consideration must precede action—if action be taken. Therefore, though the programme is pretty full for the coming meeting of the Institution, it may be that, if a communication from Mr. Doherty catches the Council in an indulgent mood, they will find an opportunity for letting the assembled gas engineers pronounce their views on the subject of stripping gas of something which the motor car industry and users want, and compensating the gas consumer for being deprived of it. At the moment, however, and at the prices to which benzol is bound to fall through the competition and supply of motor spirit, there is a fair amount of doubt as to the feasibility of the proposal. But it is as well to learn all there is to be known concerning it.

### Circumstances which Alter Cases.

Some comment has recently been made in connection with a case that has occurred in a large industrial centre, by which "theory" and "practice" have once more proved themselves to be not quite the same thing. Among the members of the Labour Party in the city referred to it has long been the custom to oppose anyone in an official capacity receiving a big salary; but now it is reported that a member of the party—and an alderman—has accepted a post which carries with it the comfortable salary of £750 a year. It is alleged that even the alderman himself on more than one occasion has declared that £400 a year is sufficient for any man; and quite recently he led his party in opposition to the appointment of an official (who was to fill a position of great responsibility) at a salary of £600. Naturally, it is felt in Labour circles that, in consenting to take a salary of £750 a year, the worthy alderman in question has rather given away the position

of the Socialist and Labour group, who (as a local paper has put it), "from their platform utterances, might be expected to fight to the death any attempt to force a big salary upon one of themselves." As a matter of fact, the alderman can only square his theory that no man is worth more than £400 a year by admitting that he himself is in practice being offered a salary which is about twice as much as his abilities merit. But those who have secured his services are hardly likely to have made such a mistake as this. What will probably actually happen will be a broadening of the views of the alderman upon the subject of what "any man" is worth—for circumstances do alter cases.

## PERSONAL.

The Home Secretary has appointed Professor C. S. SHERRINGTON, M.A., M.D., F.R.S., D.Sc., of Liverpool University, to be an additional member of the Departmental Committee on the Lighting of Factories and Workshops.

At the meeting of the Leicester Town Council last Tuesday, the resignation of Mr. F. GRIFFITH, the Water Engineer and Manager, on account of ill-health, was accepted. Mr. Griffith had been for thirty-three years in the service of the Corporation; and, on the recommendation of the Water Committee, he was appointed Consulting Engineer, at a salary of £200 per annum, subject to three months' notice. On the same occasion, Mr. G. T. EDWARDS, who had occupied the position of Chief Assistant Engineer to the Derwent Valley Water Board, was selected to fill the position vacated by Mr. Griffith, at a commencing salary of £450 per annum.

Mr. EDWARD SANDEMAN, M.Inst.C.E., has been appointed, by the Council of the Manchester University, Associate Professor in Engineering for a period of three years. Mr. Sandeman, who was formerly Assistant Borough Engineer of Blackburn, and afterwards was in charge of the Plymouth Water-Works, was in 1900 appointed Chief Engineer to the Derwent Valley Water Board. This session he delivered at the University a short course of special lectures to the staff and students of the Engineering Department. He will take as his special subject water supply and irrigation, and will be responsible for the general supervision of the courses of study, laboratory work, and drawing office tuition of students specializing in this branch of engineering.

## OBITUARY.

In the presence of a large body of mourners, the funeral took place at Mansfield, on Friday, of Mr. ARTHUR GRAHAM, whose sudden death while on a holiday in Belgium was recorded in last week's "JOURNAL." The first portion of the service was conducted at St. Peter's Church by the Rev. F. J. Adams and the Rev. H. T. Hayman, Deputy Provincial Grand Master of Nottinghamshire Freemasons—there being a large gathering of members of the craft, in whose work Mr. Graham had taken a very active interest. The mourners included Mr. T. Smith (Chairman of the Gas Committee), the Mayor (Mr. J. P. Houfton), and numerous members and officials of the Corporation, Mr. J. B. Fenwick, Gas and Water Engineer at Retford (who represented the Manchester District Institution of Gas Engineers), Mr. W. T. Buckland, of Chesterfield, Mr. G. M. Gribble, of Kirkby-in-Ashfield, and others connected with the gas industry, as well as employees at the Gas and Water Departments.

**Memorial to the Late Sir Samuel Sadler, of Middlesbrough.**—Active preparations are being made for unveiling the memorial which has been erected to the late Sir Samuel Sadler, in Victoria Square, Middlesbrough. The ceremony will be performed on the afternoon of the 21st inst. by the Secretary of State for War (Colonel the Right Hon. J. E. B. Seely, D.S.O.). The late Sir Samuel Sadler, it may be remembered, was engaged in a business which was closely associated with the gas industry.

**Joint Meeting of English Junior Associations.**—We have received the programme of the arrangements made by the President and Council of the Yorkshire Junior Gas Association for the fourth bi-annual meeting of the English Junior Gas Associations, which will be held at Sheffield on the 14th inst. The members will assemble at the Town Hall at 10 a.m., and half-an-hour later will start on their visits. The works selected are: Messrs. John Brown and Co., Limited (armour plate, &c.); Messrs. Walker and Hall (gold and silver plate, cutlery, &c.); and the Nunnery Colliery Company (coke-ovens and bye-products plant). On the invitation of the Directors of the Sheffield United Gas Company, they will partake of luncheon at the Grand Hotel, and afterwards inspect the Neepsend and Grimesthorpe works of the Company. Tea will be served in the hotel at five o'clock; and in the evening the furnace laboratory and show-rooms of the Company will be open for inspection. These arrangements extend to all members of the English Junior Gas Associations, who are heartily invited to avail themselves of them.

## ELECTRICITY SUPPLY MEMORANDA.

**Light and Life.**

OUR friends of the electrical industry speak disparagingly of the life and lighting efficiency of the inverted mantle, for the simple reason that they do not know anything about the matter. Of metallic filament lamp life and efficiency, they speak in terms of high praise—always quoting the highest life figures attainable, and referring to the uniformity of the light given by the lamps as being an unvarying quantity. People are well aware of the highly trained capacity of our competitors for exaggeration. The Engineering Standards Committee have issued a report of experiments on tungsten filament lamps undertaken by the National Physical Laboratory. From the report it is gathered that the tests indicate that at present the products of many of the electric lamp factories fluctuate very considerably as regards quality. Usually a batch of lamps is very uniform; but their behaviour is often different from another batch, even of the same rating, made at another time. This does not confirm the confidence that the electrical people assert their customers may have in metallic filament lamps. Regarding candle power drop and efficiency, the tests show that, if an average is taken of both indifferent and good lamps, a drop of 20 per cent. after 1000 hours appears to correspond with an initial efficiency of 1·2 watts per candle for the ratings tested. It will be noticed that the 20 per cent. is an average, and not the maximum found. An interesting part of the report deals with burn-outs of metallic filaments—a liability inseparable from all metallic filaments, but more particularly with those of high voltage and low watt ratings. The records of the report indicate that about 50 per cent. of the lamps tested burnt out before a life of 1000 hours was attained. How does this conform with the tales told of uniform excellence in the matter of longevity? Manufacturers advertise a burning life of well over 1000 hours. The report, however, points to the impossibility of ensuring this length of life in all cases, for the nature of the materials and processes dealt with is such as to prevent as yet such a degree of precision in manufacture. A burn-out, therefore, after 700 hours, it is said, would not be regarded as premature, but as normal. The cause of burn-outs is interesting. Normal burn-outs, it is probable, occur through a small section of the filaments rising to a higher resistance than the remainder. At that point, it therefore becomes hotter, and volatilization of the tungsten takes place at a rather more rapid rate. Thinner and thinner becomes the filament at that point, and more rapid the wasting process until collapse occurs.

**Semi-Indirect Lighting.**

Some people are very hard to please. A correspondent of the "Electrical Review," who appends to a letter the initials "H.A.W.," gaily ridicules the indirect and semi-indirect systems of lighting, believing that they constitute a misdirection of energy. Traders' electric lighting catalogues are at present full of illustrations of the various systems; and the semi-indirect ones have attained a partial popularity. "H.A.W." asks why, in these competitive days, electrical people want to go round the corner (so to speak) to illuminate, instead of directing light to where it is wanted by the shortest route. He thinks it possible and easy to design a form of screen to protect the eye from the glare of naked lights, and at the same time direct the rays where required. It is his deliberate opinion that in these days of candle-feet, indirect lighting seems very much like running half a mile in the opposite direction, and sprinting back in order to be in time to catch a train. Then, finally, he asks why waste energy, either physical or electrical, in pushing against the competition of other illuminants an obsolete and notoriously inefficient form of lighting, which is bad enough when both ceiling and reflectors are clean, but when the dust settles is hopeless? The answer to the whole of the questions is that the electricity supply industry cannot help itself. Intrinsic brilliancy and ultra-violet rays demand the screening of the light; and screening cannot be effected otherwise than by light-absorbing globes, in an artistic fashion, save by the semi-indirect system. It lends itself to highly ornamental treatment of illumination fittings; and, for this reason, it is being adopted in the gas industry, and some very tasteful fittings have been placed on the market. In connection with this matter, some semi-indirect fittings of which we have knowledge have been under test. And it has been found with them that, using inverted gas-burners above the translucent bowl, a somewhat lower candle power is required at the source than with the metallic filament lamps, in order to secure an equivalent illumination in the room. We rather think some of our electrical friends have begun to find something of the same kind, through complaints of a misty appearance in rooms where the electrical semi-indirect system is in use. We know, too, they have also commenced to learn that, where there is neglect through inaccessibility, lodgment of dust in the bowls and on the bulbs is a serious light-reducing disadvantage. In the case of the inverted gas-burners used with semi-indirect fittings, there is no necessity for globes round the mantles, and there is an excellent distribution of the light rays. The very construction of the inverted burner, and the major part of the light being radiated at angles below the horizontal, make it very suitable for the semi-indirect system. We are hoping to see this form of lighting well demonstrated at the National Gas Exhibition

in the autumn. For the general run of lighting, the economy of the gas-burner allows it to lose something in efficiency to secure decorativeness; and yet it has to lose less than the competitor.

**Litigation.**

The Osram Lamp Works, Limited, have issued an important advertisement notice, which indicates that the Company are very busy in connection with litigation, for the defence of what they believe to be their patent rights. The Company have been very successful in this matter up to the present; and among the interim injunctions which have already been granted (not to mention the cases that have gone before or the settlements) are involved the "Brewer," the "Edna," the "Goblin," and the "Oro" lamps. Actions to restrain infringement of their patents and for damages have been commenced against the suppliers of eight lamps: The "Corona," "County," "Gabriell," "Oro," "Cookson," "C.M.G.," "Kanson," and "Radiant." This is a golden crop for the lawyers.

**Those Little Pickings.**

Save in the populous centres in which manufacturing and trading is of luxuriant order, the electricity undertakings have to try hard to secure little pickings of business here and there, even if these only serve to act as a bait in eventually securing larger orders. We see that at Felixstowe, the Electricity Supply Company have arranged to supply current for lighting and boiling kettles in the tents on the beach, at the fixed charge of 10s. for the season, terminating on Oct. 14—the charge for connecting-up being 5s. No meters are to be installed, but customers can use the current as and when they please. Huts and tents on the beach and sands at our seaside resorts have become very popular; and this new electrical proposal at Felixstowe may attract a few people. But we doubt whether many out of the 250 who have rented sites there will care to pay 10s. for the service and 5s. for fitting up, and the substantial cost of fittings and electrical kettles. Little lighting can be required in the summer in the tents; and few will care for the muddle and trouble of providing teas in such places, unless their holiday habitations are situated some distance from the shore.

**Heating.**

Mr. G. Orme Bastian is an excellent man in his way. But he does not understand everything; and he appears to be equally capable of airing what he does not know as what he does know. Recently there has been a little stupid controversy over the subject of whether room warming should be accomplished by heaters placed near the ceiling or near the floor, as customary. The majority of sane men say that the natural position is in the part of a room where human beings move, and in those positions where the greatest benefit will be derived by the human structure. In the course of a letter on this matter, Mr. Bastian expresses the opinion that both gas and electric men are inclined to vastly over-rate the temperature-raising effect of radiant energy in a room enclosed by walls of the usual high heat-absorbing capacity. The secret of Mr. Bastian's opinion is probably found in his confession that the electric-heater bearing his name is an air-heater; and "this is why it produces a more satisfactory physiological effect than the luminous type of heater, which does more to please the eye than warm the person." Mr. Bastian there sets himself against far higher authorities than he can claim to be on this particular subject. He proceeds to say that he believes the gas-fire is also principally an air-heater. His belief discloses something to which we will not give a name. Because he thinks the gas-fire is principally an air-heater, is "why some 80 per cent. of the thermal units are wafted up the necessary chimney;" and he "specially commends this observation to the writer of 'Electricity Supply Memoranda' in the 'JOURNAL OF GAS LIGHTING.'" We wonder if we dare to refer Mr. Bastian to the Leeds University gas-fire tests which lasted some years, to the tests of Dr. Bone, F.R.S. (perhaps Mr. Bastian regards himself as a superior authority to Dr. Bone), and to the Glasgow tests, so that he may ascertain, if nothing else, more as to the limitations of his own knowledge on the points as to the heat units wafted up a chimney from a modern gas-fire, and as to radiant efficiencies.

**The Hebburn Explosion.**

Coming on top of the disastrous Nottingham explosion, it looks as though the Hebburn one is going to be made the ground for some trouble in another direction for the electricity supply industry. In both cases, the destructive occurrences were caused by the generation of bitumen gas, due to the fusing of electric cables. The Board of Trade have been approached by the Hebburn District Council, with a request to hold an inquiry into (1) the circumstances of the explosion, (2) the general condition and method of laying the electric cables in the district, and (3) to ascertain whether any, and, if so, what, steps should be taken to ensure the safety of the public. The circumstances of the explosion have been already well established; but it might be of some public advantage if the Board of Trade or the Home Office looked closely into both the Hebburn and the Nottingham affairs. Meanwhile, the Hebburn Council have refused to approve of the laying by the Northern Counties Electricity Supply Company of certain underground high-tension cables, unless they are placed in lead and earthenware troughs.

**High Voltages and Cooking.**

The "Electrical Times" announces that the Board of Trade have recently given the Birmingham Electric Supply Department leave to connect cooking apparatus across the outers of its three-wire system; and so probably other undertakings will seek similar authorization. The new provision forms an addition to the first standard regulation for securing the safety of the public, which allows medium pressures—*i.e.*, from 250 to 650 volts—to be supplied (*a*) for power purposes, (*b*) for arc lamps in series, (*c*) for incandescent lamps in series. The regulation reads:

> (1) The consumer's wires forming the connections to the cooking appliances, or otherwise in connection with the supply, shall be completely enclosed in strong metal casing, and this casing, together with the switches, shall be efficiently connected with earth.
>
> (2) Switches, efficient fuses, or other automatic cut-outs, shall be provided, so as to protect the circuits from excess of current; and all switches and cut-outs shall be so enclosed and protected that there shall be no danger of any shock being obtained in the ordinary handling thereof, or of any fire being caused by their normal or abnormal action.
>
> (3) All heating elements must be thoroughly protected by an earthed metal guard, which must be so fixed that it is impossible for any person using the apparatus to touch the elements.

The necessary protection will add to the cost of already costly installation. In a comment, the "Electrical Times" says that although apparently the regulation permits the use of cooking apparatus wound for voltages up to 650, in practice the concession will doubtless be utilized to balance one cooker in an installation against another or one hot-plate against its neighbour. "Manufacturers have no desire to turn out 500-volt apparatus—in fact, we doubt whether it would be possible at present to design a hot-plate to give satisfactory results at so high a pressure. . . . We do not think manufacturers will need to re-design their apparatus for higher voltages than are now customary, but so to arrange the circuits on a cooking outfit that they may be divided equally across the outers. That the concession will be welcomed by supply undertakings is certain, for it will reduce out-of-balance currents and simplify what might be a serious mains difficulty when electric-cookers become more widely adopted." "Meteor," in the course of a comment on the matter, remarks: "Cases are not unknown in this country where a couple of cookers on one side of a three-wire distributor have conspired to place half a street of houses on half rations of candle-power. And if (in places far from Birmingham) a cooker has now and then been privily perched across the outers, in order to avoid this perturbation of the balance, surely the engineer is not to be blamed for his intelligent anticipation of authority. He has but done that which was expedient, though not yet lawful."

**The Leibbrand Schemes.**

Dr. Charles Herman Leibbrand is a man of great sincerity, of fertile imagination, and of large optimism. The other week we referred to his magnificent scheme for commercially regenerating the Eastern Counties, placing Harwich in its rightful premier position as a commercial port, extracting millions of money from other countries and the North of England for materializing his ambitions and project, and for, as quite a small part of the scheme, supplying Harwich with low-priced electrical energy. Mr. Napier Prentice, whose name has often been mentioned in connection with Felixstowe, it will also be remembered, linked himself up with the electrical part of the project. It seems that Dr. Leibbrand's projects are not confined to Harwich. Felixstowe is included in his broadly bestowed beneficence—Felixstowe which has had such a chequered history in connection with electricity supply. The concern in its earlier years was always more or less in hot water, through its incapacity to walk reliably, and give satisfaction to the people of the town. The Council sought to mend matters by acquiring a controlling interest in the undertaking; but there has not been complete happiness as a result. Since, Mr. Napier Prentice, the Electrical Engineer, has at times (so it has appeared to us) shown a querulous disposition over the successes of the local Gas Company, and particularly when a seven years' gas-lighting contract for the streets was won—the duty of the Corporation being to secure for the ratepayers, quite independently of the ownership of the electricity supply, the best quality and most reliable light for the public ways of the town. However, what Dr. Leibbrand has in store for Felixstowe is that he and his friends should buy out the rights of the Council in the electricity concern; and he has laid, or is about to lay, his scheme before the Board of Trade. The people of Felixstowe do not seem to have hailed the proposal with gratification, nor, in their joy and thankfulness, to have fallen down flat before the bountiful Leibbrand. The Lighting Committee of the District Council (business men that they are) do not see why they should go to the expense and trouble of investigating the matter of value and sale at the behest of any outside parties. They are not seeking to sell; but it is Dr. Leibbrand and his associates who are desirous of buying. This being so, it is only reasonable that the latter should pay, and not the ratepayers, for any investigation that is necessary to enable the Council to come to a conclusion upon the matter. They therefore asked that Dr. Leibbrand should place at the disposal of the Council £200 for needful investigations, in order that the value of

the concern might be ascertained and a definite recommendation be made to the Council. Dr. Leibbrand raised his eyebrows in great surprise. He could not, or would not, see things in the same light as the Committee; but he wanted to handle his money again in the event of the Council—not the ratepayers, or the Board of Trade—deciding to maintain the *status quo*. The view he took was that the Council would be getting a valuation of their property at the expense of someone else, and that was not right. Some people have funny notions. Very properly, the Lighting Committee were not to be moved; and they did not see why expense should be forced on the town because Dr. Leibbrand and his associates desired possession of their electricity concern. Then the Doctor became more reasonable, and only asked for a return of £100 of the £200, in the event of the Council determining not to proceed. What the upshot of these manœuvres will be has yet to be seen.

## NEW VERTICAL RETORT INSTALLATIONS AT NOTTINGHAM AND LEICESTER.

THE installations of new vertical retort systems that are now rapidly approaching completion at Nottingham and Leicester mark notable advances for two of the largest gas undertakings in the Midlands. Difficulties entailed through labour troubles in regard to the delivery of necessary materials has led to a delay in the completion of work by the time originally contemplated. But it is anticipated, so far as Nottingham is concerned, that the plant will be in operation before the end of September; while a similarly encouraging estimate of the situation is entertained in relation to the neighbouring borough. Nottingham's present instalment is on a smaller scale than that of Leicester; representing an output of 1½ million cubic feet of gas daily, compared with 2½ millions at the Belgrave works. But contemplated developments of the Nottingham arrangements, which appear to form part of the Gas Committee's settled plan, will ultimately double the capacity there. The works in each case are being carried out on the Glover-West plan; and such is the confident reliance upon results, that at a recent meeting of the Nottingham Council a feeling of regret was expressed that the new departure had not been earlier decided upon. The changes which are now being wrought at the old Radford station, Nottingham (which has been conveniently selected for the purpose, as representing works which are in the nature of an ancient auxiliary to the larger plant at Basford), will effect a complete revolution in the existing local methods.

Apart from the delay occasioned by the causes already mentioned, the Nottingham project has been attended by many difficult engineering troubles, which have at length been adequately surmounted. The presence of water, which permeates the site, has represented one of the formidable obstacles to celerity of operations. A running stream—a diversion of the River Leen—was encountered at an average depth of about 13 feet. Being directly under one of the benches of retorts, this had first to be dealt with; the task being effectively accomplished by recourse to a stiffening process of ferro-concrete of gridiron formation girders. The trouble, however, did not end there. All around the ground is influenced by the River Trent, which, swollen by its Derbyshire tributaries, assumes a formidable volume after periods of heavy rain. But here again the drawback, entailing much laborious pumping, has been satisfactorily overcome in the area in which the elevator and breaker pit are located.

The plant, representing that which may be regarded as the first instalment of the contract with West's Gas Improvement Company, Limited, consists of 48 retorts arranged in six beds of eight; and a recent visit to the works revealed the substantial progress which had been achieved since the operations were reviewed in the "JOURNAL" for Dec. 31 last. Under the direction of Mr. R. B. Glover, the Resident Engineer representing the Contractors, in whose interests also Mr. John West has exercised continuous supervision, all the structural ironwork in connection with the benches and hoppers has been completed—the retort-bench itself being now about half finished. The saving of ground space which has been effected by the new arrangement is, on all hands, apparent; the new settings being in substitution of nine beds of seven archaic direct-fired retorts, 20 in. by 14 in., and 18 ft. 6 in. through. The economy of area will of necessity be even more strikingly exemplified when all the contemplated extensions—involving an entire metamorphosis of the old retort-house, in which the new verticals are being installed—have been completed. The hoppers, it may be added, have been finished, with the exception of the riveting, which, with other details of the work, is now in full swing.

At Leicester, where the work is being carried out according to the plans of Mr. Hubert Pooley, Assoc.M.Inst.C.E., the Gas Engineer to the Corporation, three old retort-houses on the Belgrave Gate site are being laid under contribution for the purposes of the installation. The Leicester contract involves the provision of ten beds, compared with six at Nottingham—a distinction also between the two undertakings being that the foundation work at Leicester has been carried out by the Corporation themselves. The first bricks were laid for the piers in January; work upon the benches being commenced about six weeks later than at Nottingham. Considering the delay occasioned in regard to the delivery of steelwork and other materials, excellent progress has also been effected here.

While in each case the engineering details have presented many features of interest, there is an element of pleasurable consideration involved as to which of the two Midland Corporations may first have the opportunity of bringing the new plant into actual use.

## INSTITUTION OF GAS ENGINEERS.

### Programme of the Annual Meeting.

THE programme of the Annual General Meeting of the Institution of Gas Engineers, which, as already announced, is to be held in London from the 17th to the 19th inst., under the presidency of Sir Corbet Woodall, D.Sc., M.Inst.C.E., the Governor of the Gaslight and Coke Company, has been issued by the Secretary (Mr. Walter T. Dunn).

The business will be transacted in the Caxton Hall, Westminster; and the proceedings on the opening day will consist of the submission of the minutes of the last meeting for confirmation, the appointment of scrutineers to examine the ballot-papers for the election of officers, members of the council, and ordinary and associate members, and the welcome of delegates from kindred societies. Then will follow the presentation of the testimonial portrait to Mr. Thomas Newbigging, D.Sc., M.Inst.C.E., the Birmingham Medal to the President, a resolution of thanks to Mr. S. Y. Shoubridge on his retirement as Hon. Secretary of the Institution, the medals awarded for papers read last year, and the report of the Council [some extracts from which are given to-day], with the accounts for the year ended Dec. 31 last. The President will then deliver his Inaugural Address, and it will be followed by the reading and discussion of papers, a list of which was given in the "JOURNAL" for the 22nd of April (p. 232). The proceedings will be adjourned about two o'clock.

On the second day, the annual general meeting of the contributors to the Benevolent Fund will be held at half-past ten; and at its close the technical business of the Institution will be resumed, and continued till about two o'clock. At half-past three, there will be a joint meeting of Commercial Sections, to which all members of the Institution are invited. In the evening, the Institution's Jubilee Dinner will be held in the Connaught Rooms, Great Queen Street.

On Thursday, the remaining papers will be dealt with, and the usual closing business—including the fixing of the place of meeting for next year—disposed of.

On Friday, the President and Lady Woodall will give a garden party at "Walden," Chislehurst.

### Annual Report of the Council.

The Council open their report by pointing out that it is of special interest from the fact that it is to be submitted at the fiftieth annual meeting; the Institution's progenitor—the British Association of Gas Managers—having come into existence in Manchester on Dec. 15, 1863. They refer with gratification to the distinctions bestowed during the year under review on the President, as well as on Mr. Dugald Clerk, Mr. Thomas Newbigging, and Mr. Charles Carpenter. The President had the honour of knighthood conferred upon him, and, with Mr. Newbigging and Mr. Carpenter, was made a Doctor of Science of the University of Leeds; Mr. Dugald Clerk receiving a similar honour from the University of Manchester. The Council have decided to award the Birmingham Medal this year to the President, in recognition of the distinguished services he has rendered to the gas industry in so many ways.

MEMBERSHIP.

The total number of names on the register at the end of the year 1912 was 862, as compared with 865 for the previous year. The following table shows how the difference has arisen :—

| Class of Member. | At Dec. 31, 1911. | Elected or Transferred during 1912. | Deceases, Resignations, Transferences, &c., during 1912. | At Dec. 31, 1912. | Increases and Decreases. |
|---|---|---|---|---|---|
| Hon. members . . | 22 | 1 | .. | 23 | 1 |
| Members . . . . | 715 | 17 (7 transf'rd) | 14 | 718 | 3 |
| Associate members. | 115 | 8 | 9 | 114 | −1 |
| Associates . . . | 2 | .. | .. | 2 | .. |
| Students . . . . | 11 | 1 | 7 | 5 | −6 |
| Total . . . | 865 | 27 | 30 | 862 | −3 |

The Council express regret that the deaths of the following members have to be recorded :—

| | |
|---|---|
| John Cocks | Manchester. |
| William Cowley | Spennymoor. |
| Robert Lee Deans | Johnstone. |
| Arthur Graham | Mansfield. |
| George B. Irons | Gosport. |
| A. W. Onslow | London. |
| J. W. Randell | London. |
| Walter Tom Tew | Warwick. |
| Joseph Tysoe | London. |
| James M. Veevers | Rochester. |

### Last Annual Meeting.

Reference is next made to the proceedings at the forty-ninth annual general meeting, held in London in June last, under the presidency of Mr. R. G. Shadbolt, of Grantham. As usual, a list of the papers submitted is given, and the names of the recipients of awards for communications read at the preceding meeting are recorded. In accordance with a resolution passed at the last meeting, the Council have considered how arrangements for the reading and discussion of papers may be improved, so as to afford more time for members to speak on the subjects brought forward. They have decided to ask authors to prepare and give abstracts of their papers, instead of reading them *in extenso*—advance copies of the papers to be prepared for issue before the meeting to members making application for them in accordance with the usual practice. With the object of improving the value of the discussions, it has been arranged that members shall be asked to indicate on a reply form issued before the meeting the papers they desire to discuss.

### Examinations in "Gas Engineering" and "Gas Supply."

Mr. Thomas Glover, the Examiner in "Gas Engineering," reports that at the examinations held on the 19th of April last 277 candidates presented themselves; 104 taking the Honours and 173 the Ordinary paper, as compared with 260 last year (92 Honours and 168 Ordinary). Mr. Walter Hole, the Examiner in "Gas Supply," reports that at the examinations in this subject, which were held on the 26th of April last, the number of candidates presenting themselves was 538, consisting of 139 in the Honours and 399 in the Ordinary Grade, as compared with 407 last year (112 Honours and 295 Ordinary). The names of the prize winners in the examinations last year, which have already been given in the "Journal," are recorded.

### Education and Certification of Gas-Fitters.

The Committee having this matter in hand report that, in introducing it to the City and Guilds of London Institute, a deputation from the Council waited upon Sir Philip Magnus, the Superintendent of the Department of Technology, and found him sympathetic and encouraging in respect of the scheme generally, but somewhat averse to the granting of certificates without written examination. At his request, the syllabus was arranged for a three-years' course and submitted to him for the consideration of the Institute's Examination Board.* In submitting the scheme finally, the Council brought to the notice of Sir Philip the fact that members of the District Associations had again expressed themselves strongly on the question of written examinations. But the Board think it "undesirable to depart from the practice of the Institute, in accordance with which a written examination forms part of the examination in all trade subjects." The Council recommend that the proposals of the Institute be adopted.

### National Gas Exhibition.

The Joint Committee having in hand the organization of this Exhibition to commemorate the Centenary of Gas Supply and the Jubilee of the Institution, and consisting of representatives of the Institution, of the Society of British Gas Industries, of the British Commercial Gas Association, and of the Municipal and Private Gas Undertakings of the United Kingdom, report that "everything augurs well for the success of the undertaking." The exhibition, which is to be held during the month of October in the Exhibition Halls adjoining the White City, Shepherd's Bush, is being arranged on the co-operative principle, in which exhibitors will combine to produce collective exhibits; thus eliminating objectionable competition, and resulting in a far more attractive display than has been attained at previous exhibitions. The Committee in their report state:

> It is anticipated that, in order to carry out the undertaking in a manner worthy of the occasion, a sum of at least £25,000 will be required, which it is hoped will be provided in equal proportions by gas undertakings and plant and apparatus manufacturers. Of this amount, roughly £4000 † still remain to be contributed by gas undertakings; the members of the Society of British Gas Industries having practically guaranteed their moiety.

The Council express the hope that, as the influence of the exhibition will have a far-reaching effect on the gas industry as a whole, every undertaking in the kingdom will contribute its share to the cost which is being incurred.

### Reports of Committees.

*Carbonization Committee.*—The Carbonization Committee report with regret the resignation of Mr. S. Y. Shoubridge as Hon. Secretary and of Mr. Harold W. Woodall. Mr. J. Ferguson Bell has been appointed to succeed Mr. Shoubridge, and Mr. E. W. Smith, of Birmingham, has been elected a member of the Committee. The Committee have not yet been able to arrange for comparative tests to be made of different carbonizing systems under identical conditions.

*Refractory Materials Committee.*—This Committee report that they have been inquiring into the working of Section I. of the Standard Specification—viz., that relating to retort material. This section was issued in December, 1910, and though sufficient time has not yet elapsed to be able to judge of its efficacy, owing to the fact that most of the manufacturers had to make some alterations in their methods of manufacture, and there was, therefore, some delay in supplying the standard specification material, yet a considerable amount of this has now been made; and with the view of ascertaining how far it complies with the various tests laid down, the Committee have, in collaboration with the Retort and Fire-Brick Section of the Society of British Gas Industries, arranged for a series of independent tests to be carried out by Dr. Mellor on samples of retort material obtained from various works. The results of these tests will be embodied in the Committee's annual report at the forthcoming meeting of the Institution.

### Institution Gas Research Fellowship.

The Council hoped to have received for presentation at the meeting a report giving an account of the work on surface combustion which Mr. Harold Hartley has carried out at the Leeds University during his tenure of the Institution Gas Research Fellowship, 1909-12. It has, however, unfortunately not been possible for the records to be completed in time for Professor Bone, under whose direction the work was done, to prepare the report for this year's meeting.

The University Senate, on the recommendation of the Board of Science and Technology, have appointed Mr. Harold Hollings, B.Sc., to the Fellowship for the year 1912-13. Professor John W. Cobb (Livesey Professor of Coal Gas and Fuel Industries), under whose direction Mr. Hollings is working, reports that the greater part of Mr. Hollings' work has been an examination of the thermal behaviour of coal during the distillation process. Small quantities of coal were heated in an electrically heated furnace, and the products of distillation swept away by a stream of purified nitrogen. He adds:

> It was hoped that some light might be thrown on the exothermicity or otherwise of the distillation process; but the varying heat conductivity of coal during distillation precludes the possibility of obtaining data on the net thermal result. Nevertheless the distillation process has been separated into several distinct stages, during which exothermic or endothermic reactions are proceeding. The effect of prolonged distillation at certain fixed temperatures suggested by the limits of these stages on the heating curve is now being studied. Further research will be directed towards the elucidation of the various stages in the distillation and the effect of the varying heat conductivity of coal during distillation on the results already obtained. It is also intended to examine different types of coal by this method.
>
> In view of the rapid strides which are being made in the development of the carbonizing process, it seemed of interest to determine in the laboratory (where certain experimental conditions can be better fixed than in a manufacturing operation) the effect of hot surfaces and radiant heat on the distillation products of coal. The experiments so far conducted have consisted in—
>
> (1) Distilling coal so as to obtain the products before they have been subjected to any excessive decomposition by heat.
> (2) Passing the products through an empty hot tube so as to subject them to the action of radiant heat.
> (3) Passing the products through a hot coke bed so that the influence of the hot surface might be determined.
>
> Analyses have been made of samples of gas taken at various stages of the distillation; and the total yield of gas and its composition have been estimated. Interesting observations have also been made on the quality of tar produced; and a separate series of distillations has been carried out to determine the ammonia yield under the above conditions. In future work, it is proposed to examine the behaviour of individual distillation products which may be added in the desired proportions to a purified coal gas.

### Imperial College of Science and Technology.

The Council were invited in April last to send a small deputation to inspect the Engineering and Chemical Technology Laboratories now in existence, or under construction, at the Imperial College of Science and Technology at South Kensington, and Messrs. F. J. Bywater and F. W. Goodenough accepted this invitation on behalf of the Council. They report that they were met at the College by the Rector, Sir Alfred Keogh, and Professor W. A. Bone, who explained to them the very complete arrangements which are now in course of development for the training of students in advanced Chemical Technology. A feature of these which is particularly interesting to the Gas Industry is the foundation of a Department of Fuel and Refractory Materials, under the direction of Professor Bone. All students desiring to take up this course of study must have received at least three years' training in Chemistry, Physics, Mathematics, &c., at the College or elsewhere, before they are allowed to take up the advanced work in the study of fuels and refractory materials. The students are at present working in temporary laboratories, but in the new buildings now being erected there will be large laboratories for the analytical and the practical testing of fuel and refractory materials, a small retort-setting and gas-producer plant, purifiers, washers, &c., and a gasholder for storing gas for experi-

* This is given *in extenso* (with the correspondence which took place) in the report.

† This amount has since been reduced to £2700.

mental purposes. In fact, everything is being done to give students who have received a good grounding in pure science a complete insight into the practical uses of solid and gaseous fuels. A portion of the training will also consist of study of practical work at gas and producer-gas works, coke-ovens, chemical works, &c.; and it is hoped by the authorities of the College that gas engineers in London and the district will co-operate with them in this work by allowing students to visit their works, and, if necessary, spend one or two weeks there, in order to obtain an insight into the practical side of coal-gas and carburetted water-gas manufacture.

Having regard to the class of men it is intended to train, and to the thoroughness with which the training will apparently be carried out, it appears very desirable that sympathetic consideration should be given to this invitation of the College authorities, as the new department will undoubtedly result in the training of a valuable class of expert technical men, the want of which has frequently been felt by the industry. It is not intended for the College to compete with the similar departments at Leeds University, but rather to travel on parallel lines, and to offer to students in London and the South of England similar facilities to those now available at Leeds.

### Photometry and Street Lighting.

*International Commission on Photometry.*—During the year, the arrangements referred to in the Council's last report have been in progress with a view to drafting a new constitution of the International Commission on Photometry on broader lines than the existing one. The Committee, acting on behalf of the Institution in this matter, consists of Messrs. Edward Allen, John Bond, W. J. A. Butterfield, H. G. Colman, and Robert Watson. In response to a proposal received by the Institution from M. Vautier, the President of the Commission, it has been decided to approve of the summoning of a meeting next autumn on an enlarged basis of representation, at which the consideration of the constitution of the Commission shall be the principal business.

*Standard Specification for Street Lighting.*—Subsequent to the report made last June by the Institution's representatives (Mr. S. Y. Shoubridge and Mr. R. Watson) who serve on the Joint Committee dealing with this matter, the Institution of Electrical Engineers, on behalf of the Joint Committee, submitted to the respective Councils of the Institution of Municipal and County Engineers, the Illuminating Engineering Society, and the Institution of Gas Engineers, a draft of the proposed standard clauses for inclusion in a specification of street lighting. The main points of the specification were outlined in the annual report presented last June, and these had been from time to time discussed by the Council of the Institution. The draft clauses, when ultimately issued complete by the Joint Committee, were again fully considered, and the Institution's representatives were glad to find that the objections advanced by them at the commencement, and maintained throughout the meetings of the Joint Committee, met with the unanimous support of the members of the Council. After again fully considering the draft specification, the Council officially replied that, while they appreciated the useful and valuable technical work accomplished, they regretted that they could not agree with the fundamental basis of the suggested specification—viz., the stipulation of illumination with a stated foot-candle minimum measured on a horizontal plane. The reasons given were that a specification so based was not calculated to do equal justice to the various lamps employed in general street lighting, and varying in location and height; it was not an adequate measure of the illumination actually received and used by the public; it did not sufficiently take into consideration the physical and other differences of light sources; and the small fractional character of the readings lent themselves too readily to observation errors and contractual difficulties.

As a result of these objections, the Joint Committee decided to avail themselves of an invitation given by the Illuminating Engineering Society for a full discussion of the proposed specification at a meeting of that body, when all interested might have the opportunity of discussing its merits and demerits. Mr. A. P. Trotter (a member of the Joint Committee) undertook to present a paper on the subject, and the members of the various Institutions represented on the Joint Committee were generally invited to attend and take part in the discussion. Mr. Trotter accordingly read a paper on "Standard Clauses for Inclusion in a Specification of Street Lighting" before the Illuminating Engineering Society; the meeting being held at the House of the Royal Society of Arts on the 15th of April last [see *ante*, p. 250]. The paper was an able and accurate account of the proceedings of the Joint Committee, and the members are referred to it for general information of the work done by the Committee.

The subsequent discussion of the subject, continued at an adjourned meeting held on the 29th of April [see *ante*, p. 397], was both full and useful—indicating that not only is there considerable diversity of opinion as to the points which should be covered by any "Standard Specification," but that the objections raised by the Council of the Institution of Gas Engineers had ample justification. The debate was promoted for the purpose of obtaining the views generally held by those interested in street lighting matters; and the opinions expressed will doubtless receive the full consideration of the Joint Committee.

### Factory Lighting; Ventilation.

At the request of the Home Office Committee on Factory Lighting, the Council have arranged for several witnesses to give evidence before the Committee on questions relating to industrial lighting installations in various kinds of workshops.

In response to a proposal made by the Council to the authorities of the Leeds University, a Joint Committee, consisting of representatives of the University and of the Institution, is to consider the desirability of carrying out experiments and reporting on the natural ventilation of a room heated or lighted by gas, or on some allied subject to be recommended by the Committee. The names of the representatives of the University on this Committee are shortly to be announced; and the Institution is to be represented by Messrs. John Bond, J. H. Brearley, E. W. Smith, and Charles Wood.

### Alkali Manufacturers' Opposition to Gas Bills.

As the result of continued action on the part of the Institution, in conjunction with the Gas Companies' Protection Association, a Joint Select Committee of the House of Lords and the House of Commons was appointed to consider the residual products question. The following was the resolution passed by both Houses under which the appointment was made:

That it is expedient that a Select Committee of five Members of the Commons be appointed to join with a Committee of the Lords to consider whether any, and, if any, what, restrictions should be imposed on gas authorities with respect to the purchase and manufacture of the residual products resulting from the manufacture of gas by other gas authorities, or of other chemicals.

The Council reproduce the report of the Committee, which was given in the "Journal" for Dec. 15, 1912 (p. 893), and point out that it shows that the attitude adopted by the Council on the recommendation of the Parliamentary Committee has been completely vindicated.

### Income-Tax and Depreciation.

The Council express their pleasure in reporting that, as the result of the action of the Committee on which the Institution was represented by Mr. R. G. Shadbolt and Mr. W. R. Herring, a satisfactory settlement has been arrived at in regard to questions of income-tax and depreciation as relating to gas undertakings other than those owned by municipal or other public authorities. The representatives held about a dozen meetings, including several long conferences with the Chief Inspector at Somerset House, and they resulted in a detailed scheme which has been approved by the Board of Inland Revenue and by the Committee, who therefore recommend its adoption by the gas companies of the country. The scheme refers to gas undertakings other than those owned by municipal or other public authorities. This was made a condition by the Chief Inspector at the outset of the negotiations, as the Inland Revenue authorities consider that municipal gas undertakings come within a scheme agreed with the Municipal Accountants' Association. The scheme submitted has not been agreed to by the Board of Inland Revenue as in any way applying to municipally-owned gas undertakings. The representatives are, however, of opinion that the rights of these latter undertakings cannot be disposed of in so inequitable a manner, and that sooner or later municipally owned gas undertakings will probably combine, and seek adjustments along similar lines to those of the scheme submitted.

The total number of gas companies definitely assenting to the scheme is 286; but as they represent more than 60 per cent. of the gas output of the companies of the country, the Committee, with the Board of Inland Revenue, feel that the support received was sufficient to justify the general recommendation of the scheme. They therefore passed the following final resolution: "That the Committee approve the scheme as amended and approved by the Board of Inland Revenue, and recommend the same for adoption by the gas companies of the United Kingdom." Income-tax surveyors will therefore, in due course, be supplied with copies of the scheme as an acceptable basis for purposes of income-tax assessment; and it remains for each individual gas company to accept it or not as appears to them most desirable.

The text of the scheme is given in the report; and it will also be found in the "Journal" for Sept. 24, 1912 (p. 830).

### National Insurance Act, Part II.

*Unemployment Insurance.*—A Committee, consisting of Messrs. R. G. Shadbolt, Alexander Wilson, Robert Watson, Samuel Glover, and John Bond, representing the Institution, with Messrs. H. E. Jones, Charles Carpenter, George Clarry, Edward Allen, and D. Milne Watson, representing the Gas Companies' Protection Association, was appointed to obtain decisions of the Umpire as to the applicability of Part II. (Unemployed Insurance) of the Act to workmen employed in gas undertakings.

The Committee had several meetings, and finally appointed Mr. G. Clarry, Mr. D. Milne Watson, and Mr. Alex. Wilson a Sub-Committee to attend the Umpire and the officials of the Board of Trade appointed under the Act for the purpose of putting the gas companies' case before the Umpire, and for obtaining further information. The Sub-Committee, after meeting the Umpire and also the officials of the Board of Trade, and visiting the Nine Elms station of the Gaslight and Coke Company, for the purpose of inspecting a retort-bench at work, in company with two of the last-mentioned officials, and taking into consideration the published decisions of the Umpire, report as follows:—

While there are still some questions relating to the gas industry on which the Umpire has to give his final decision, and although other

points may arise which will have to be referred to the Umpire, sufficient information has been obtained to enable the Sub-Committee to advise gas undertakings as to the probable work on which contributions will or will not have to be paid under Part II. of the Act.

*Gas-Works.*

The manufacture of gas not being one of the insured trades, the Sub-Committee are of opinion that all men wholly or mainly engaged in the actual manufacture of gas are free from the operation of Part II. of the Act. The men so employed include coalmen, stokers, firemen, ashmen, pipemen, barrowmen, cokemen, purifiermen, boilermen, exhauster and engine men, pumpmen, stoking-machine men, elevator and conveyor attendants, locomotive drivers and shunters, men loading coke—in fact, all workmen or attendants engaged in any of the operations of manufacture, from the receiving of the coal to the despatch of the coke.

Further, draughtsmen, timekeepers, storemen, gatemen, watchmen, weighmen, office attendants, commissionaires, clerks, and typists engaged in the gas department, and all workmen wholly or mainly employed in shoeing horses or making or repairing stokers', firemen's, or other hand tools, will not come under Part II. of the Act.

Contributions are, however, payable for all workmen while they are wholly or mainly employed—

(1) In the construction, alteration, repair, decoration, or demolition of buildings.
(2) In the manufacture, erection, and repair of all engines, exhausters, pumps, stoking-machines, elevators, conveyors, &c.—in fact, all kinds of machinery.
(3) In the construction, repair, and decoration of all vehicles.
(4) In the construction, reconstruction, or alteration (but not repair) of all works of construction, such as retort-benches, gas-producers, flues, boiler-settings, chimneys, holders, purifiers, scrubbers (when not operated by machinery), condensers, mains, roads, railways, bridges, &c.

*Note* I.—The word "alteration" does not refer to work usually charged to revenue account.

*Note* II.—While the question of retort-benches and gas-producers being classed as "works of construction" is reserved, it is expected that they will be put into this class, and therefore that all workmen engaged in the ordinary repair, cleaning, resetting, and general upkeep of retort-settings or gas-producers will not come under Part II. of the Act.

*Residual Works.*

Practically the same rules will apply to the chemical and residual works in connection with gas-works.

*Distribution Department.*

In the distribution department, contributions are not payable under Part II. of the Act for men wholly or mainly employed on—

(1) Gas-fitting—*i.e.*, gasaliers, brackets, &c.
(2) Removable gas-stoves.
(3) Repairing gas-meters, or cocks or valves used in connection therewith.
(4) Laying or repairing branch or service pipes.
(5) Repairing or renewing gas-mains.
(6) Erecting or repairing lamps and lamp-posts used for street-lighting purposes.

But contributions are payable for workmen wholly or mainly employed on—

(1) The laying or construction of gas-mains (other than services), the cost of which would usually be charged to capital account.
(2) The carcassing of "buildings" with gas-pipes.

Since the issue of the foregoing report, the Sub-Committee have been in constant communication with the Umpire on many questions relating to the work of the employees of gas undertakings, and additional decisions have to be recorded; the most important being those referring to retort-benches and the fitting-in of gas heating and lighting appliances and their repair and maintenance.

The decision relating to retort-benches confirms the opinion expressed by the Committee that these erections are "works of construction," and, therefore, that contributions are payable for all men wholly or mainly engaged in "the building and fitting-up of all new work, and also the reconstruction and alteration of same," but that contributions are not payable for men wholly or mainly employed in "the repair and upkeep of same."

The decision relating to the fixing of gas appliances modifies in an important manner the opinion formerly expressed by the Committee—viz., "that contributions should not be paid for men engaged wholly or mainly in the work of installing these appliances, and connecting same up to the permanent piping of buildings."

One decision (No. 1315), given mainly at the instance of representatives of the Trade Associations concerned, and against the repeated representations of the Sub-Committee, makes it clear that contributions must, in future, be paid for all men wholly or mainly employed on all piping work (except that on service-pipes from the main to the meter) in buildings, and also the first installation of lighting appliances.

The full list of decisions relating to the workmen employed by gas undertakings to date is included in the report.

EIGHTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

At the request of the Council Dr. Rudolf Lessing undertook to be the delegate of the Institution at the above-named Congress, which was held in Washington and New York from the 4th to the 13th of September last year. In the course of his report, he says that, out of 535 papers read at the sectional meetings, he has selected those which should be of some interest to gas engineers; and in an appendix to his report he gives their titles and the names of the authors. He presented to the Congress the report of the International Commission on Analyses "On the Determination of Moisture in Coal and Other Minerals" [*ante*, p. 259]. It was received by a joint meeting of the Section for Analytical Chemistry and the Section for Fuels, and it led to a very interesting discussion. The report represented the joint work of nearly twenty chemists in all parts of the world, and Dr. Lessing says it should "go far to standardize the important method for the determination of moisture in fuels."

He also presented a paper of his own to the section for fuels and asphalts, dealing with the new coking test devised by him, and communicated to the last annual meeting of the Institution.* It was a matter of gratification to him to find that the United States Government had already adopted the test in the laboratory of the Bureau of Mines.

An inspection of the well-known Astoria works of the Consolidated Gas Company of New York was included in the programme. Two trips through the United States were arranged for members of the Congress; the longer one extending to the Pacific Coast. Dr. Lessing took part in the official tour for three days only—making subsequently a trip on his own account to various places of interest. The gas-works of the cities visited were almost invariably included in the official programme. The Pittsburgh coal and iron district presented a particular interest, as did also the Government laboratories dealing with fuel and refractory materials. Natural gas is a great commodity in this district, simplifying furnace construction very considerably, more especially in steel-works. Among the cities visited were Philadelphia, Pittsburgh, Niagara, Buffalo, Erie, Cleveland, Detroit, Toronto, Montreal, and Boston; and at all places Dr. Lessing had a very cordial reception.

Dr. Lessing concludes his report by expressing his deep appreciation of the honour conferred upon him by the Institution in appointing him their delegate to this important Congress, the labours of which will, he considers, not only be fruitful to the chemical industries proper, but will add to the knowledge of gas engineers and further the welfare of the gas industry. He then gives the list of selected communications referred to by him.

PROPOSED INSTITUTION BUILDING.

A Committee, composed of representatives of the Institution, the Society of British Gas Industries, and the British Commercial Gas Association, have been appointed to discuss the desirability of formulating a scheme for the erection of a building for use as headquarters of the gas industry. They report that, while approving of the idea of such a building, they consider the present time inopportune for putting a scheme forward; and they suggest that the subject should be further considered after the termination of the gas exhibition now in course of arrangement.

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Appended to the report, which is signed by the President (Sir Corbet Woodall) and the Secretary (Mr. Walter T. Dunn) is a list of presentations to the library; and then come the accounts, bearing the above-mentioned signatures, and also those of the Auditors, Mr. James L. Chapman and Messrs. Wood, Drew, and Co. The subscriptions from gas companies and corporations and the Society of British Gas Industries to the Publicity and Special Purposes Fund stood on Dec. 31 last at £14,645, of which £14,209 was transferred to the British Commercial Gas Association and £436 to the Special Purposes Fund. The carry-forward on the Association account is £2684.

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**Report of the Benevolent Fund Committee.**

The Committee report that during the year ended Dec. 31, the amount of £304 12s. 6d. was received. Subscriptions produced £165 19s. 6d.; donations, £18 17s.; and interest on investments, £106 1s. 4d. The expenditure amounted to £323 19s. 4½d.; £303 10s. having been granted in the relief of necessitous cases, and £20 9s. 4½d. paid for printing, postages, and bank charges.

[The list of contributors for the past year and a copy of the accounts, duly certified by the Auditors, Mr. James L. Chapman and Messrs. Wood, Drew, and Co., are appended to the report.]

* See "JOURNAL," Vol. CXVIII., p. 855.

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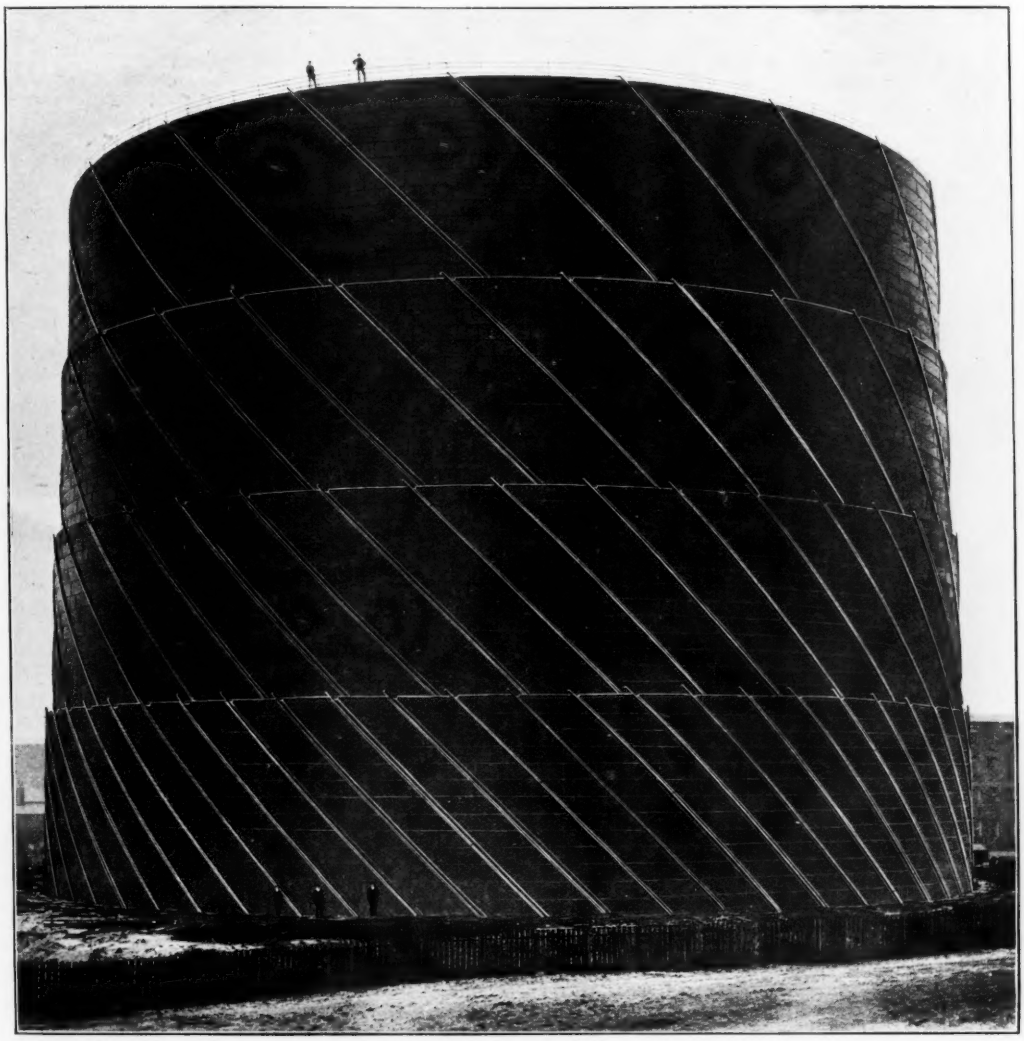
The Institution of Mining Engineers will hold their fifty-eighth general meeting in London on Thursday; and in connection with it there will be, on the following day, alternative visits to the Beckton Works of the Gaslight and Coke Company and the Chingford reservoir of the Metropolitan Water Board. Those going to Beckton will be the guests of the Directors of the Gaslight and Coke Company at luncheon, after being conducted over the works.

# A NEW FOUR-LIFT SPIRAL-GUIDED HOLDER FOR OLDHAM.

THERE is to be inaugurated to-morrow (Wednesday) a new four-lift spiral-guided gasholder at the Hollinwood Station of the Oldham Corporation; and we are indebted for the following description and illustrations to Mr. Tim Duxbury, the Gas Engineer to the Corporation.



**THE FOUR-LIFT SPIRAL-GUIDED GASHOLDER AT THE HOLLINWOOD GAS-WORKS OF THE OLDHAM CORPORATION.**

Lifts 201 ft. 9 in., 204 ft. 6 in., 207 ft. 3 in., and 210 ft., by 40 ft. deep.

The storage capacity at the Hollinwood station was, prior to the erection of this holder, only 2,200,000 cubic feet, with a maximum output in 24 hours of 3,633,000 cubic feet. There are fourteen gasholders at Oldham, eight of which are column-guided, one with a flying lift, one rope-guided, and four spirally guided. The total storage capacity is now 12,500,000 cubic feet; and the total maximum output in 24 hours is 8,600,000 cubic feet. Within the past eight years the total storage capacity has been increased by 6,250,000 cubic feet, or just doubled.

There are over 500 mills and workshops in the area of gas supply, with a maximum consumption of 750,000 cubic feet of gas per hour; so that the storage capacity is now equal to 17 hours' supply, which is none too much in these days of strikes, &c. The total quantity of gas made during the year ended March last was 1,563,620,000 cubic feet—the increase in the past ten years being 315,482,000 cubic feet.

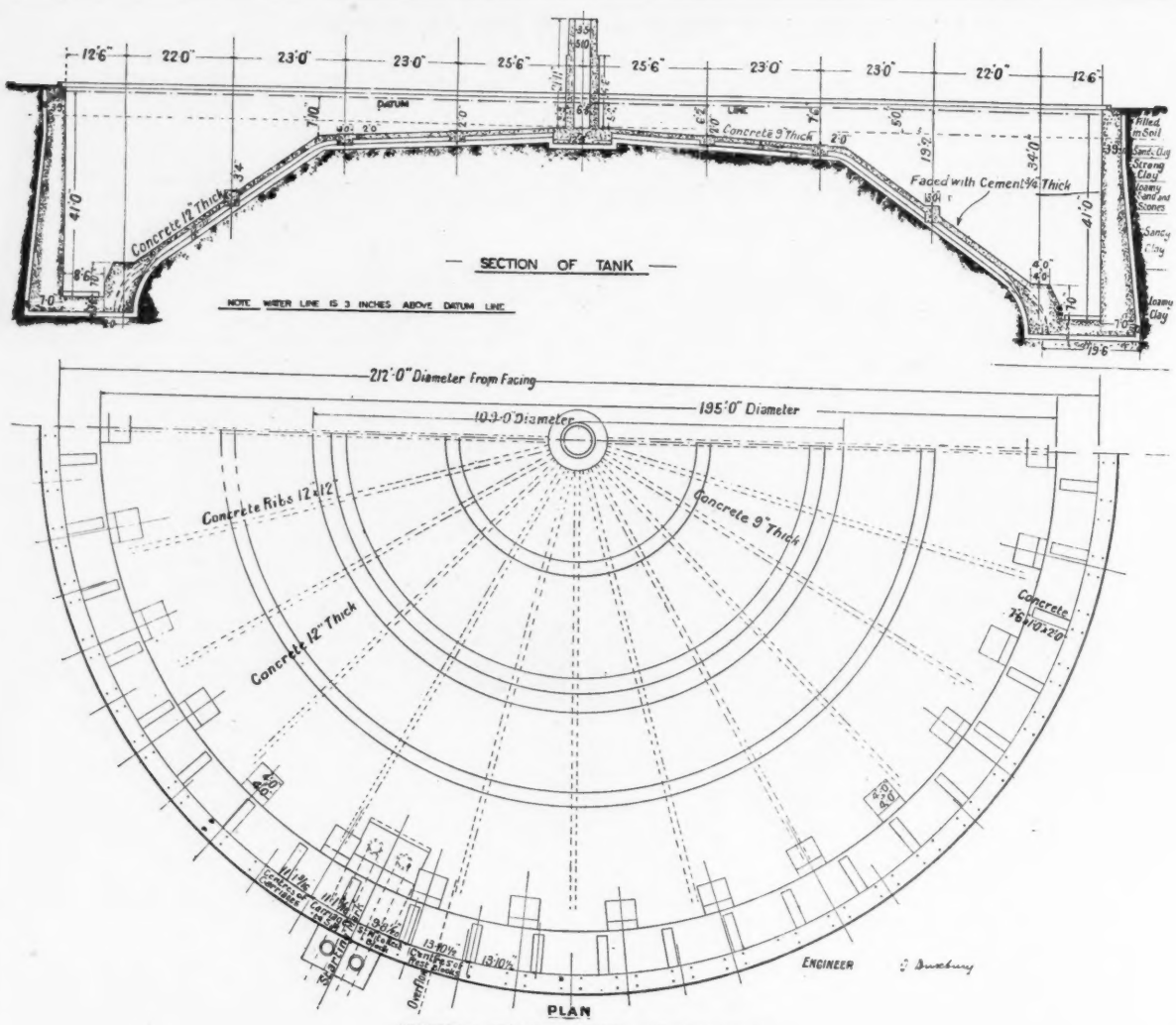
## THE SITE.

As there was no available land for a large gasholder inside the present works, a site was secured as near to the works as possible. The Gas Committee own a plot of land at Bower Clough, about half-a-mile away, within the Chadderton boundary; but owing to colliery workings this site is not suitable for the erection of a gas-holder tank. No. 2 site was opposite the gas-works offices, and was a very convenient site; but a three or four lift holder could not be erected there, owing to right of light. Besides, the site was in the Failsworth area. No. 3 site, which was the selected one, is situate just within the Oldham borough boundary; and the rateable value of a £50,000 gasholder will come into the borough funds. This site is only 100 yards from the gas-works, from which the holder can easily be seen for stocktaking purposes. The borings indicated that this site was most suitable.

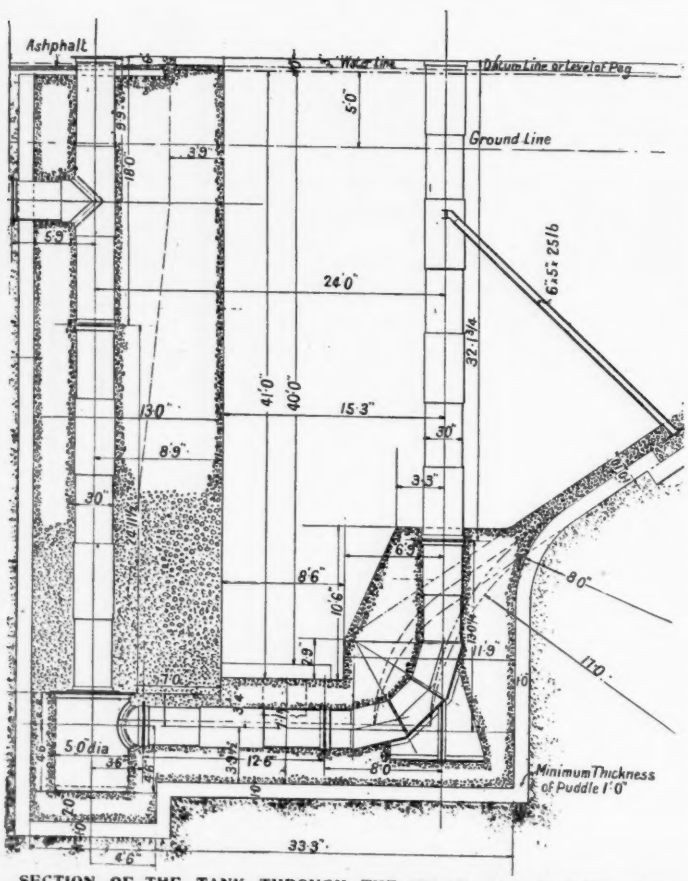
| | No. 1 Bore. Ft. In. | No. 2 Bore. Ft. In. | No. 3 Bore. Ft. In. | No. 4 Bore. Ft. In. |
|---|---|---|---|---|
| Surface soil | 0 10 | 1 0 | 1 6 | 1 6 |
| Sandy clay | 2 2 | 6 0 | 3 0 | 3 0 |
| Strong clay | 4 6 | — | — | — |
| Coarse gravel | — | 1 0 | — | 2 0 |
| Loamy sand, &c. | 6 6 | — | — | — |
| Sandy clay and stones | — | 13 0 | — | — |
| Sandy clay | 11 0 | — | — | — |
| Loamy sand | — | 3 0 | — | — |
| Loamy clay | 20 4 | — | — | — |
| Sandy clay | — | 21 0 | — | — |
| Clay and stones | — | — | 45 6 | 44 6 |
| | 45 4 | 45 0 | 50 0 | 51 0 |

## THE CONCRETE TANK.

The concrete walls were carried up in 9-inch layers round the whole circumference, until they reached approximately the height of the wall above the surrounding ground; the work being done from the outside of the tank, and the inner surface being kept true by means of close shuttering. Most of the earth nearer the centre of the dumpling was removed by carting to the outside of the tank and dumping up, so as to make a backing for the wall as the work progressed. This, of course, was in addition to the earth taken from the trench and hoisted by means of steam-cranes from the commencement of the work. As soon as the embankment was brought up to the level of the concrete wall, the steam-cranes and rails were removed to a more convenient position on short sleeper tracks, built partly upon the wall and embankment. The four




DETAILS OF THE TANK CONSTRUCTION.




SECTION OF THE TANK THROUGH THE INLET AND OUTLET PIER.

cranes were not allowed to run along the wall of the tank, for fear of disintegrating the green concrete, but were used as fixed cranes; and the rest of the excavations taken from the slope of the dumpling were removed thereby, and used for levelling-up the surrounding land, and the surplus taken to the tip.

The portland cement used was provided by Messrs. Trechmann and Co., and weighs 112 lbs. per striked imperial bushel. The cement on no account was used fresh. The bags were emptied out on a concrete floor under cover provided by the Corporation; the cement being in layers 12 inches deep, and turned over at least once a week for fourteen days before using. The fineness of the cement after being gently shaken was 0·4 per cent. residue after passing through a mesh sieve of 80 by 80, and not more than 6·4 per cent. residue with a 180 by 180 mesh sieve. From repeated tests, the tensile strength of the briquettes (of neat cement mixed with 22½ per cent. of water), after being in moulds for 24 hours, was 640 lbs. per square inch, after seven days' immersion in water. The aggregate was provided by the Corporation, and broken up so as to pass through a 3-inch mesh riddle.

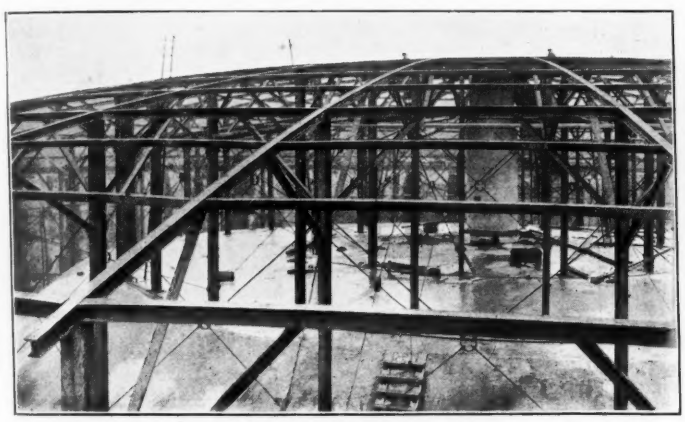
The sand used for concreting was from ground gritstone and sharp pit sand, free from dirt or loamy matter. The sand and gravel from the excavation was not considered to be satisfactory for important concrete work. All the concrete used for the wall was composed of 1 part of cement to 5 parts of broken bricks, and 1 part of sand.

The required quantities of the three materials were measured in specially-constructed measuring frames, the process being as follows: First the aggregate was measured, and then the required quantities of cement and sand were placed on top, and turned over once while in a dry state. The whole was thrown into a revolving concrete-mixer, and water added to convert the mass into jelly-like consistency. All concrete was placed in its final position immediately after mixing, and was dropped from a height not exceeding 5 feet. It was then thoroughly rammed into position, and care was taken to see that the steel reinforcements were thoroughly embedded in the liquid concrete, and that no

voids were left. Wherever a stop had been made in concreting, and before recommencing the work, the existing concrete was cleaned and thoroughly picked; and a thick grouty mixture of cement was poured over same, prior to the new work being added. The whole of the clay required for puddling purposes was obtained from the excavations—being of excellent quality; and it was well tempered in a "pug" mill.

On Aug. 8, 1910, the Chairman of the Gas Committee (Alderman Jason Thimpson) cut the first sod for the erection of the new concrete tank and spiral holder at Hollinwood; and on Sept. 28 the same year, the tank contractor commenced operations, which were completed by Oct. 28, 1911.

The tank-wall is composed entirely of portland cement concrete, and the cone or dumpling of blue lias lime concrete, with a 12-inch backing of clay puddle. The tank, after all settling, compression, and contraction had taken place, was perfectly true and cylindrical. The measurements are 212 feet internal diameter and 40 ft. 10 in. deep from the surface of the tank rest-blocks to the top of the tank wall, and 40 feet deep to the water overflow; and it contains about 5,000,000 gallons of water, weighing 22,000 tons. There is 36 feet of the tank below the original ground level, and about 5 feet above.



**Interior Framework.**

The trammel bar was substantially built of timber, strutted, braced, and guyed with steel wire ropes vertically and laterally, and counterbalanced at the short end. The whole was constructed in such a manner as to easily revolve the full diameter of the tank without variation. From the end of the radius arm, a heavy plummet was suspended on copper wire, and employed for constantly plumbing and gauging the work as it proceeded.

To allow for the closing-in when the weight of the backing came upon the wall, the tank was made 1½ inches larger in diameter than specified. This allowance proved practically correct when the measurements were taken prior to filling with water. The excavations for the tank wall were made by cutting a trench over the whole of the circumference of the tank to a depth of 40 feet below the ground-level datum mark.

Very little water was encountered during the excavations; but in case of emergency, a 6-inch pot drain was laid round the bottom of the tank at the foot of the cone, for carrying the water to the cesspits of sumpholes for pumping. Preparation was made for constructing an external sump 45 feet deep by 10 feet square; but as there was so little water to contend with, this work was not carried out.

In excavating for the wall, the trench was left vertical on the dumpling side, and with an overhang of 3 feet on the puddle side to follow the batter of the wall—that is, 13 ft. 6 in. at the top to 16 ft. 6 in. at the bottom of the cutting. This was done to save expense in excavation and refilling at the back of the wall after being constructed. The extreme width of cutting excavated at the bottom was 19 ft. 6 in.; 3 feet of this being underpinned into the dumpling, so as to allow of the full width of the tank well to be concreted at one and the same time as the wall foundations, to avoid vertical joinings in the work. It was specified to cut the trench 19 ft. 6 in. wide from top to bottom, with parallel sides; but the contractor preferred the above method.

The timber shuttering and shoring was carefully withdrawn as the work proceeded. The tank walls were formed of portland cement concrete, and are 7 feet thick at the base, tapering to 3 ft. 9 in. thick at a height of 31 ft. 10 in., and continuing parallel up to 41 ft. 10 in. The bottom of the well is made 3 feet thick, and along with the piers for the internal framework stanchion, &c., was made of portland cement concrete. The reinforcement consists of 21 steel bands, 6 inches wide by ⅜ inch thick, which completely surround the tank, and are embedded at intervals in the wall, at a point two-thirds the thickness of the concrete wall at that particular section from the inside of the wall. Each ring is in 27 lengths, lap-jointed and riveted together.

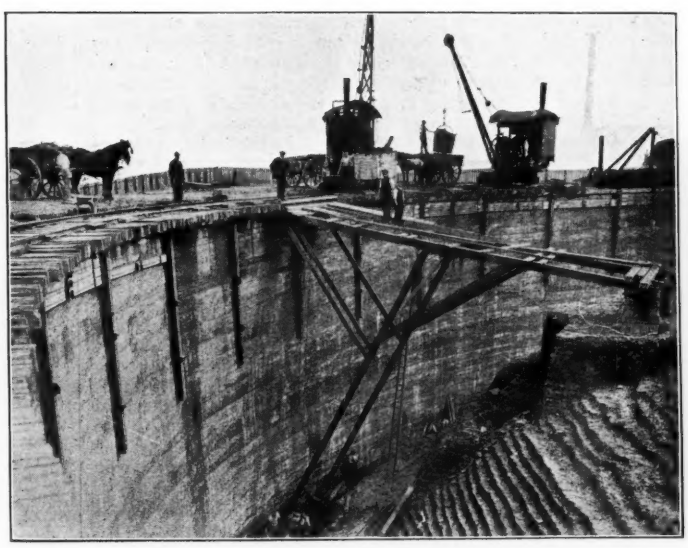
The whole area of the tank dumpling was covered with lias lime concrete, mixed in the same proportion as specified for the portland cement concrete—viz., 1, 1, 5. The slope was made 12 inches thick, and the crown 9 inches thick, strengthened underneath with 24 concrete ribs 12 in. by 12 in. in section, radiating from the centre pier to the bottom of the tank. These also form strengthening ribs to the circular ledges or platform for stanchions.

The cone of the tank starts 8 ft. 6 in. from the face of the wall, and 2 ft. 9 in. above the bottom of the tank, and has an inclination to the horizontal of 35°. The slope is carried to within 7 ft. 10 in. of the water overflow line, and afterwards has an inclination of 1 in 17 up to 5 ft. 2 in. below the same line near the centre pier. The whole of the interior surface of the tank was carefully prepared and rendered with ½ inch thick 1 and 1 sand and portland cement, and finished with a coat of neat cement ¼ inch thick, and the surface worked until it was perfectly smooth. Afterwards the whole surface of the wall was again subjected to a cement wash.

The inlet and outlet pipes are 30 inches diameter, and pass under the bottom of the tank through a special concrete block and upwards through the wall, which is again suitably enlarged to receive them. Behind the concrete wall, and under the dumpling, a layer of 12 inches thick clay puddle was placed in 6-inch layers. This puddled clay was obtained from the tank foundations, and proved to be of a first-class quality. All the tempering of the clay was done above ground, and when required was passed through a puddle machine and carted to its final position to be well rammed, afterwards being backed-up with earth to protect it from the sun.

The top of the wall is recessed in sixty places to receive the base plates of the roller carriages for the fourth lift. These recesses are 6 inches deep; the bottom being 1 inch above the tank overflow; and each one has a curb round, so as to keep the water in, should it rise above the overflow.

The holding-down bolts for roller carriages are embedded in the concrete wall, and anchored 8 ft. 6 in. below the wall top. To give the tank a finish, a curb is constructed, 1 foot high by 9 inches thick, from the inner face of the tank, where the same passes over the above-mentioned recesses. The whole are filled in flush with the tank top, and afterwards neatly finished with a coating of cement plaster.



**Excavation of Dumpling—Showing also the Wall of the Tank.**

There is an asphalt path about 9 feet wide round the tank; the rest of the surrounding land being tastefully set out with lawns and flower beds. The ground upon which the tank is constructed is enclosed with a substantial brick panel wall with terra cotta coping, and large entrance gates. Also a boiler-house and store-room have been installed on the ground; the former containing a vertical boiler, 12 feet by 4 ft. 3 in. diameter by 100 lbs. steam pressure per square inch. This is for supplying steam to the anti-freezing apparatus during the winter months.

It was intended to test the tank with water on completion, and prior to the steel contractor commencing the erection of the holder. But as the tank contractor was four months late, it was decided not to fill the tank with water until the steel contractor had completed the erection of the holder. Therefore, the tank was not filled until twelve months after its completion. The time occupied in constructing the tank was thirteen months.

### The Holder.

Having had previous experience with three four-lift spiral-guided gasholders (the height of each lift in one case being only 24 feet and in the other two cases 29 feet, and the diameters about 100 feet), when the question arose of putting in a 5,000,000 holder the Gas Committee decided to adopt a four-lift spirally-guided one.

When fully inflated, the top of the crown of the holder stands about 170 feet above the water-level of the tank.

The inner lift of this holder is 201 ft. 9 in. diameter, the second lift 204 ft. 6 in. diameter, the third lift 207 ft. 3 in. diameter, and the outer lift 210 feet diameter—each lift being 40 feet deep. The diameter of the tank is 212 feet by 41 ft. 9 in. deep.

The dome in the bottom of the tank is prepared with steps, on which stand 105 rolled steel joist uprights of 12 in. by 5 in. section, well braced with 1-inch diameter tie-rods, with rings for adjusting same, supporting a framing consisting of fifteen main bars of 6 in. by 5 in. rolled steel joist section, fifteen secondary bars of 6 in. by 5 in. rolled steel joist section, and fifteen rows of crossbars, also of 6 in. by 5 in. rolled steel joist section, to which the inner ends of the secondary bars are attached, and three other rows of 6 in. by 5 in. rolled steel joist purlins on the tops of the stanchions. In addition to these, there are eight rows of intermediate purlins of 4 in. by 3 in. by $\frac{5}{8}$ in. steel angle.

The whole of the roof framing is attached to a channel-ring fixed round the concrete centre pier in the centre of the tank; and there are two other channel-rings built round this concrete pier, to secure the ends of the bracing-rods. The whole of the framing remains fixed in the tank and supporting the roof of the gasholder, when the holder is empty and at rest.

There are twenty guide-rails on the inner lift, thirty on the second lift, forty on the third lift, and sixty on the outer lift—all engaging with cast-steel rollers and mild steel carriages and bed-plates fixed on the dips of the lifts, and on cast-iron base-plates bolted down to the tank-piers. These rails are fixed in every case to a plate 12 inches wide by $\frac{3}{4}$ inch thick, fixed to the side sheets at an angle of 45° with the vertical. The outside face of the plate is free from any laps, and presents a smooth surface for the rails to be riveted to. The joints of these plates butt together, and are covered on the inside only with suitable strong steel straps. As the rails are about 58 feet long, it was necessary to joint these also; and they were sawn into a V shape at the joint, fitted together, and a steel cover riveted to the back flange inside the gasholder—thus making a thoroughly strong joint, and keeping the rails perfectly lineable.

The front flange of the rail is about $2\frac{1}{2}$ inches wide, and specially rolled for use as guide-rails in spiral-guided holders. The weight of the steelwork in the holder is about 1128 tons; and the actual working capacity is 5,045,339 cubic feet, the gross capacity being 5,388,887 cubic feet. The roof is rather steeper than usual, having a rise of 17 feet—*i.e.*, struck to a radius of 308 feet.

In all cases, great care has been taken in the rollers and carriages to have sufficient allowance between the rollers and the carriages for any expansion of the holder due to variations in temperature. At the same time, the grooves of the cast-steel wheels are turned out to a template, so as to fit the front flange of the rails fairly accurately. Thus it would be impossible for the rail to get clear of the rollers without breaking either the roller-flange or the carriages.

On the outer lift, the tops of the rails have been stiffened by means of angle and plate brackets from the top of the dip, because, when the outer lift is gripped and the pressure is transferred to the tank-carriages and to the tops of the rails of the outer lift, a little extra strength is required here before the dip of the outer lift rises level with the carriages; and by means of these strengthening brackets, the strain is carried down to the dip. In addition to these, there are circumferential gussets strongly tying all the rail extensions on the outer lift to the side sheeting.

The whole of the rails in the holder slope in one direction; and in each lift the top row of side sheets is projected above the curb and dips, and cut out at the rails in such a way that any overflow of water from the roof or dips would be guided down the rails instead of running down indiscriminately over the side sheets and dirtying the paint.

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The holder was put into use for the first time in November last, and during the winter has withstood the severest of gales when nearly inflated to its full extent. It may not be out of place to mention that the present holder is the fourth spiral-guided holder that Messrs. R. Dempster and Sons, Limited, of Elland, have satisfactorily carried out for the Gas Committee, and that it is the largest ever erected of its type.

The cost of the holder and internal framework was about £24,000. This works out at £4 9s. per 1000 cubic feet of the total capacity, equalling £4 15s. per 1000 cubic feet of working capacity. The cost of the tank complete, not including the inlet and outlet pipes, was about £13,000. This works out at £4 8s. per 1000 cubic feet on the total capacity of the holder. The tank work was carried out by Messrs. Jonathan Partington and Sons, of Middleton Junction, Oldham.

## EFFECT AND CONVENIENCE IN GAS-FITTINGS.

**Some New Semi-Indirect Productions, and a New Form of Ignition and Extinction Device, by Messrs. Ingram and Kemp, Limited.**

In the competition with electric lighting, it is very essential that the gas industry should bring before consumers, and persistently educate them up to, the latest that is produced by manufacturers of gas-fittings, so demonstrating that the most up-to-date fittings our competitors can show are equalled by what is available for gas lighting purposes. Messrs. Ingram and Kemp, Limited, of Birmingham (whose London show-rooms are at 26, Hatton Garden), are makers of high-class fittings for gas lighting; and there one sees that, in artistic and chaste design, there is nothing that distinguishes in merit the fittings from those used for electric lighting. As a matter of fact, if it were suggested to the firm that there was a distinction, they would regard it as a distinct reflection on their designing and productive ability. But we can say something to our readers which the firm, trading as they do freely with both industries, cannot say. It is this: We know that, taking equal volumes of light, and hours of use, the gas industry can supply illumination for domestic purposes cheaper than the electrical industry; and, therefore, in certain spheres of its operations, the electrical industry has to do its utmost to cut down expense for the consumers. In palaces, mansions, and the magnificent rooms of hotels and clubs (where expense is not studied in securing effect), there the richest and most expensive of fittings are installed. But when we come to the more extensive field furnished by ordinary domestic life, there our electrical competitors are, in the effort to make their system popular by cutting-down expense, relying more and more upon flexible lamp connections than upon high-class fittings. Through the economical agency of gas supply, the gas industry can do a great deal to cultivate among householders a taste, in suitable positions, for really artistic fittings of the most modern form, and such fittings the manufacturers are supplying—the latest being those of the semi-indirect type. These are already produced at such prices that, where they are preferred, the ordinary householder need not be without one of them in his drawing and dining room. What is more, the existing position of the gas-fixtures in such rooms of most houses favours the conversion from the old type fitting to the very newest form.

### Requirements for Semi-Indirect Fittings.

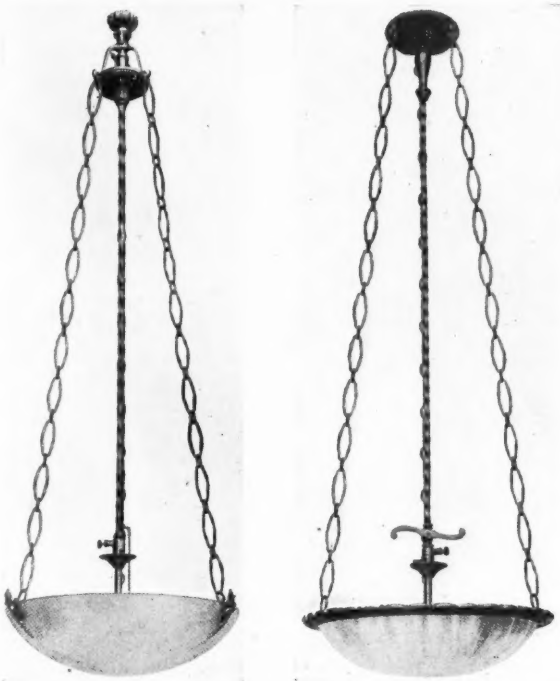
Through experience, Messrs. Ingram and Kemp, Limited, have already come to the conclusion that, in the semi-indirect system of lighting, there are three things that are necessary to the attainment of the utmost efficiency. In the first place, a heavy metal ring or band for supporting the glass bowl or dish is a mistake, though, if fancy prefers such a band, there can be compliance by forfeiting part of the efficiency. The second point is that deep bowls are a mistake, and that shallow ones are preferable, both on the score of illumination efficiency, and of facility in dusting—the deeper bowls giving better scope and shelter for dust, which it is more difficult to remove from them than in the case of shallow bowls. The third point is that the material of which the bowl is composed is a matter of considerable importance in the maintenance of efficiency.

With the band support and deep bowls, the full benefit of the reflected rays is not obtained. With the heavy band, some of the light is cut off; and, with the combined band and deep bowl, it is impossible to get the correct angles of incidence and reflection as with the shallow bowl and no band. In the construction of the new semi-indirect gas-fittings, the firm have made a particular study to get with them the correct direct angles of light. This, associated with the fact that, with the inverted gas-burner, similar candle-power units have greater penetrating power in the necessary direction than metallic filament lamps, does away with the complaint of users of semi-indirect electric lighting that they cannot get sufficient light with the commonly used units (without the aid of a local light) by which to read. With the new semi-indirect fittings equipped with inverted gas-burners, tests by the firm show that, of the direct illuminating power of the burners, 30 per cent. is obtained from below the bowl, 60 per cent. by reflection from the ceiling, and there is a loss of only 10 per cent. of useful light. This is not much to lose in order to gain ornamentation and effect, as well as obviate the direct association of the optical organs and the source of the light. In other words, given a good ceiling, a pleasing, bright, and yet reposeful effect in illumination all over the room is secured, without glare.

Messrs. Ingram and Kemp, Limited, have disposed of the ring-band by providing three isolated ornaments at equi-distant points round the bowl, which ornamental attachments are connected to chains running from the upper part of the fitting. The bowls are drilled. Each metal ornament on the inside carries a screwed peg, which passes through the hole in the bowl, and a nut completes the support, with the use on both sides of the bowl of a small leather washer. There is nothing here to impede the complete diffusion of the light rays. As mentioned, the bowls are supported by chains, made with alternately large open and small links. The firm are also getting away from the old plain gas-supply tube from ceiling to burner, by using a small supply-pipe with external cable formation. The stock semi-indirect fittings are made for one, two, or three burners; but to order, they can

be made for any number. The fittings are good to look at; and they are good in service.

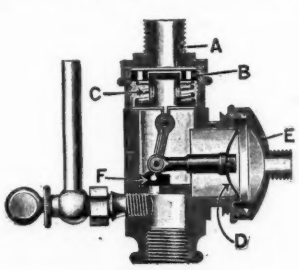
With regard to the new shallow bowls, these are in stock sizes of 10, 12, 14, and 16 inches; and larger ones are made to order—in fact, the firm are now producing a fitting for gas for one customer with a bowl 26 inches in diameter. Further, the bowls can be produced in the useful and plain form shown in the illustrations, or in more elaborate designs. As the result of wide investigations, they have found a special glass, admirably meeting the requirements of these bowls, which can be made of plain translucent design, or of ornamental patterns. But the form in which the



firm prefers to use the glass is as imitation onyx, the coloured markings of which are splendidly done; and as the glass is specially annealed for the purpose of burning-in the colouring, having in fact been brought up to a molten state, it is obvious that its heat-resisting capacity for use with gas-burners is great. The illustrations show the ordinary forms of the new semi-indirect fittings, specially designed to meet the requirements of gas lighting, and to get maximum efficiency. Messrs. Ingram and Kemp, Limited, are to be congratulated upon keeping abreast of the requirements of the gas industry.

### A Simple Lighting and Extinguishing Device.

These new semi-indirect fittings bring us into contact with a patent new diaphragm valve for lighting and extinguishing gas-burners merely by air pressure and suction, by pulling-out or pushing-in a knob on a small fixture on the wall. In the fittings produced by the firm—pendants or brackets—by ingeniously devised means, the wires and valves are perfectly concealed. The invention is very simple; and, when better known, we believe the contrivance will become quite popular. From the illustration it will be seen that a piston has no part in the design, and that the structural features are such that there will be little wear, and little to get out of order. Simplicity is an essential in gas lighting and

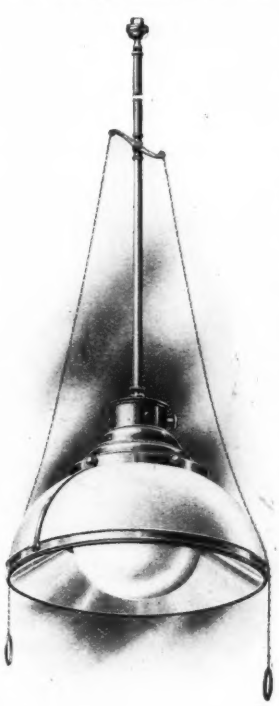



extinguishing appliances; and it is found here. The illustration shows the gas-way closed; and the parts are quickly described by the reference letters. A is the cap which provides access to the adjusting washer B, which loosens or tightens the spring C. This spring keeps the sliding-valve F on its seat. D is the diaphragm, worked by air pressure and suction; and E is the cap to which air connection is made. Examination of the fittings in the firm's show-room shows how easily access is obtained to the regulator for the bye-pass. A special point is made of this in both pendants and brackets, in view of the variation of pressures in different gas-supply districts. In the past, there has been some attempt to imitate the electric push. But in this connection with the new valve, it is desired that the operating device shall be specially identified with gas; and so the knob of the wall fitting is simply pulled-out for the purpose of opening the gas-way, and pushed home to close it, and so extinguish the light. The device has been under test for quite a considerable period in a large public institution—in one case, the point of operation is quite 150 feet from the point of ignition and extinction. Notwithstanding, no trouble has resulted. The device can be used on existing fittings, as well as with the firm's special fittings; but there cannot, of course, be the same concealment of the tube and valve. With the special fittings and the new valve, complete rivalry is established with electric fittings and operation. The simplicity of the whole thing, and the rapid response of the igniting and extinguishing device to the operation of pull and push, commend it.

## A NEW SUGG LAMP.

It is no more than a few weeks since an illustrated account was given in the "Journal [*ante*, p. 17] of some of the very beautiful fittings that Messrs. William Sugg and Co., Limited, of Westminster, have designed with the object of meeting the demand which is being experienced for semi-indirect lighting by means of inverted gas-burners; and in addition to those then referred to, opportunity has now been afforded for inspecting and seeing in working order another pattern of lamp of the same class which has since been perfected. Not a great deal in the way of explanation is called for regarding this semi-indirect lighting fitting, in view of the article that has already appeared on the subject; but it may be said it is an excellent one, and is suitable for interior lighting in all cases where protection of the eyes from a bright light source is felt to be desirable—schools being a case in point.

At present, it is being made in one size, to consume 4 cubic feet of gas per hour. The burner is of the superheater type—fitted with an interior gauze, to give the gas a slow travel, and so get it more heated before reaching the nozzle. In fact, Messrs. Sugg are now sending out practically nothing but this type of burner. An enamelled steel chimney, with reflector, is provided; and some alteration has been made in the air-chamber at the top—that is, instead of regulating the air supply by means of three ports, there is only one, which is found to be rather more convenient in this particular case. In connection with the gas-regulator, too, a new little idea is embodied; the end of the spindle having a slit cut in it, into which a coin, for instance, can be put, and the adjustment made without any fear of burning the fingers. The special feature, however, is, of course, the glass. The reflecting shade at the top has a dull surface on the inside, which gives a very good reflecting effect. To the bottom of this shade there is attached by screws a metal band, carrying a light obscuring dish or bowl, which in turn is surrounded by a wide rim of clear glass. Thus, while the brightness of the mantle is hidden from the eye, the reflected light passes without obstruction through the clear glass referred to. In addition to the screws for attaching the lower to the upper portion, three metal safety straps connect the gallery with the top of the fitting.

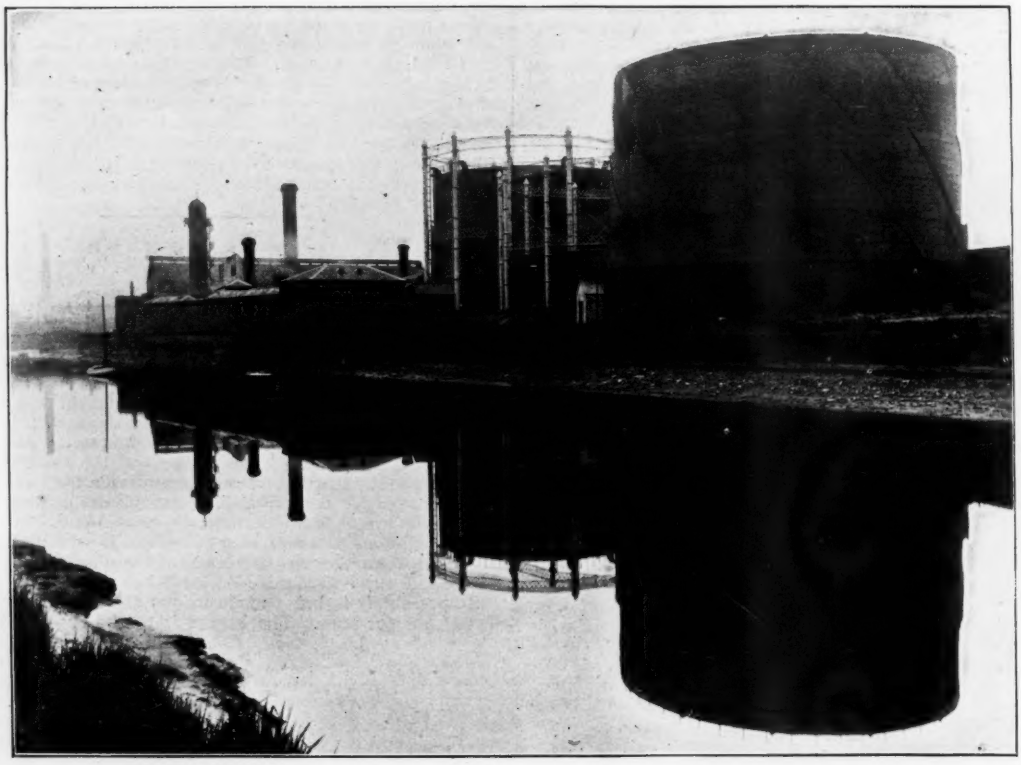


**Semi-Indirect Lighting Fitting.**

The dish is made in three styles—opal, opalescent, and ground; and while all give a pleasing effect, there is, of course, some difference in the amount of light that is obscured. With the ground glass, the mantle is visible, and the light is very white; whereas the opal gives a much softer illumination, and the light source is not visible at all. A happy mean between the two is found in the opalescent dish, with which the light source can be seen, while a warm illuminating effect is still secured. Whichever style of dish is chosen, the effect will be found most restful; and, although with semi-indirect lighting other considerations than candle power have to be taken into account, the fitting is an excellent one from the purely illuminating point of view. Measured underneath the lamp, and with a consumption of 4 cubic feet of gas per hour, as much as 120 candles have, it is stated, been obtained with a ground glass dish, 110 candles with the opalescent, and 108 candles with the opal type.

# MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

**Quarterly Meeting at Chester.**



A CURIOUS PHOTOGRAPH—VIEW OF THE CHESTER GAS-WORKS FROM THE OPPOSITE SIDE OF THE RIVER.

THE One Hundred and Sixty-Seventh Quarterly Meeting of the Manchester District Institution of Gas Engineers was held at Chester on Saturday.

### A CORDIAL WELCOME.

The visitors, who numbered between 100 and 120, were cordially greeted by Mr. JOHN C. BELTON, the Engineer to the Chester United Gas Company, and President of the Institution, on their arrival at the ancient and historic city; and, by the courtesy of the Chairman and Directors of the Company, afterwards inspected the gas-works, a description of which is appended.

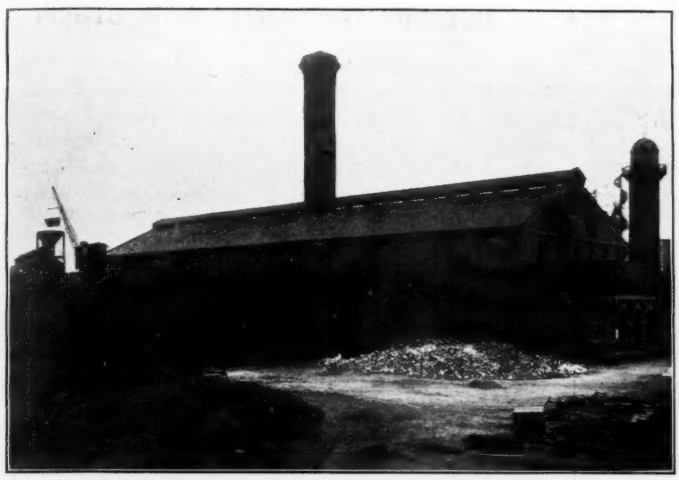
The Chester United Gas Company is (as its title indicates) the outcome of the combination of two rival undertakings—the Chester Gas Company and the Roodee Gas Company. The present gas-works stand partly on the site of the old Roodee Gas Company's works and on adjacent property acquired by the new Company after the amalgamation. Part of the site was formerly a ship-building yard; and evidences of this industry are still found when new excavations have to be made for foundations. The works are now bounded on the river-side by a stone retaining wall, behind which the formerly sloping river-bank has been filled up so as to form a level yard. This wall, and the gas-works which it bounds, were built by Mr. Fletcher W. Stevenson, who was the Company's Engineer and Manager from 1878 to 1888, when he left to take the post of Engineer and Manager to the Sheffield United Gas Company. He was succeeded at Chester by the late Mr. Robert Hunter. Mr. Hunter, who was President of the Manchester District Institution of Gas Engineers in 1884, died in 1898, and was succeeded by the present Engineer, Mr. J. C. Belton.

The retort-house, built about 1880, was designed for the production of a million cubic feet per day, and was a ground-floor house containing 224 retorts, set in sixteen arches each containing fourteen retorts in beds of seven set back to back, and heated on the direct-fired principle. In 1890-1, the present plant was installed. The walls were raised; a new single-span roof took the place of the old double-span one; and the house was altered to the stage-floor system. The old benches then made way for two blocks of seven arches each, containing deep regenerator settings of sixteen retorts in beds of eight. Coal breaking and elevating machinery, and manual charging and drawing machines were introduced; and the producing capacity of the plant was thus increased to over 1½ million cubic feet per day. In the following year, coke-handling plant was added—consisting of a system of rails and tipping waggons; a loco-crane travelling on an elevated gantry; and a rotary screen (steam driven) and coke hoppers. The economies that resulted from these alterations considerably exceeded the amount they were estimated to produce, and have fully justified the sweeping changes involved.

The remainder of the plant has been gradually brought up to the same daily capacity as the retort-house. It comprises annular condensers; two exhausters, 60,000 and 80,000 feet per hour; tower scrubber; Walker's purifying machine; two sets of purifiers, each consisting of four 24 ft. by 22 ft. by 5 ft. boxes, with Weck centre-valves; a Livesey washer for naphthalene extraction; and a 60,000 feet per hour station meter. Of the three gasholders, two are column-guided. One of these has an annular cast-iron sunk tank; the other a concrete tank. The third holder is spiral-guided, and has a steel tank, half sunk, on concrete foundation. It was erected by Mr. Hunter in 1893. [The "Transactions" of the Manchester Institution for 1894 contain a description of this holder by Mr. Hunter.] There are two station governors. One supplying a low-lying district is of the single-bell type, and was formerly used in the Cuppin Street Gas-Works of the old Chester Gas Company. The other (and a 16-inch safety bye-pass governor) is of the Cowan "compensating" type. The holder valves and a Maxim carburettor are also situated in the meter-house. The supply of water for works purposes is furnished by gravitation from cast-iron tanks over the stokers' mess-room, to which the water is raised from the River Dee by two Evans's ram-pumps. Sulphate of ammonia is manufactured; and the plant used presents some interesting features. The proximity of the London and North-Western Railway Company's (North Wales) main line viaduct affords covered storage which is utilized to the fullest advantage for coal and sundries.

The statutory requirements for illuminating power have not been revised in harmony with modern practice; 15 candles being prescribed. The quality of the supply is kept up to from 16½ to 17 candles.

There is no siding into the works, and everything but the tar has to be carted. The railway yards are about a mile from the works. Tar is loaded into boat-tanks from gravitation tanks on the river-side. The coke-skips used are made on the works, which are furnished with a well-equipped smithy, and fitting and carpenters' shops. There is a good laboratory and photometer room at the back of the offices. The removal of the gas-fittings department to Cuppin Street set free a large apartment which had been used as gas-fitters' stores and workshop. This has been converted into a comfortable club-room for the use of the Company's employees, and is replete with a good billiard-table, rifle range and other facilities for recreation. Here the workmen's club members meet in the evenings, and greatly appreciate the opportunities for social intercourse, and the excellent entertainments with which their leisure hours are beguiled during nine months of the year. A range of fitting-shops, stores, and show-rooms has been erected



The Retort-House and Coke-Yard.

at the back of the Company's offices in Cuppin Street; and a good selection of modern fittings, fires, stoves, and domestic gas appliances is always on view.

Under the guidance of Mr. Belton and his assistants, a profitable hour was spent in the works, after which the visitors were entertained at luncheon at the Grosvenor Hotel. In the unavoidable absence of the Chairman of the Company, Mr. J. Meadows Frost, Mr. JOHN CULLIMORE, J.P., the Deputy-Sheriff of the County of Chester, and Deputy-Chairman of the Company, presided.

At the close of the repast, there was a short

**BUSINESS MEETING.**

The PRESIDENT suggested that, as time was valuable, the members would doubtless agree to the minutes of the last meeting being taken as read.

This course was unanimously agreed to.

LETTERS OF APOLOGY.

The HON. SECRETARY (Mr. W. Whatmough, of Heywood) read a number of letters of apology for non-attendance, including one from Sir Corbet Woodall, the President of the Institution of Gas Engineers.

NEW MEMBERS.

The following new members were announced: Mr. C. Loveridge, of Chesterton; Mr. J. H. Davies, of Oswaldtwistle; and Mr. W. L. Heald, of Preston.

THE LATE MR. ARTHUR GRAHAM.

Before passing to the ordinary business,

The PRESIDENT said he regretted to state that the Manchester Institution and the profession generally had suffered a great loss by the death of their well-known friend and colleague, Mr. Arthur Graham, of Mansfield. He (the President) was sure the members all deplored his demise; and he proposed that they should forward an expression of their sincerest condolences to the widow and family of their colleague.

The members silently signified their approval.

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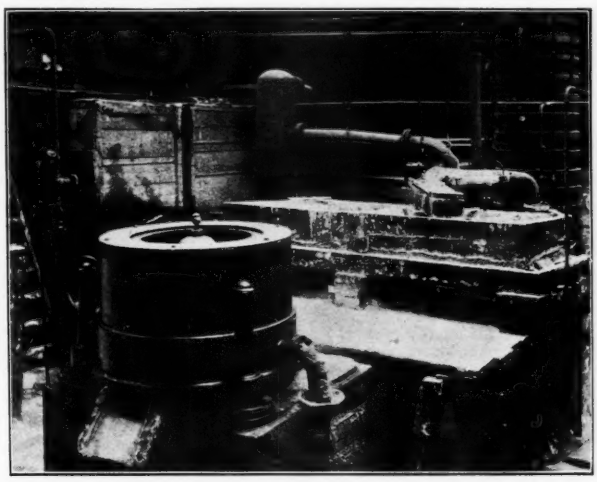
THE LUNCHEON.

Mr. CULLIMORE, who was heartily cheered, gave the Loyal Toast, after which,

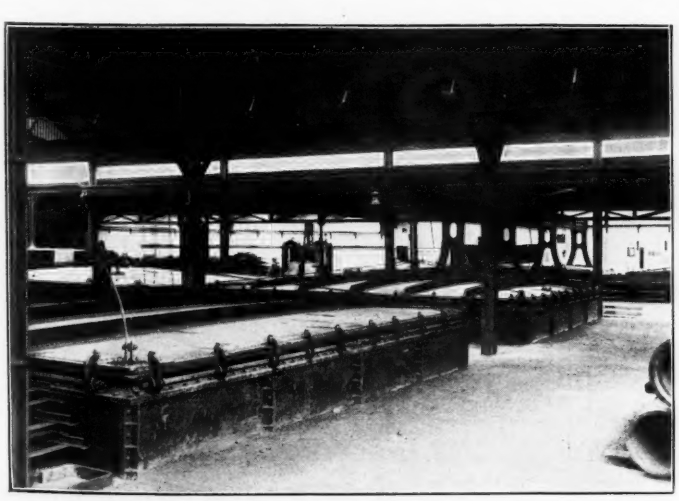
Mr. J. G. NEWBIGGING (Manchester) said he had been honoured by being entrusted with the principal toast of the day—"Success to the Chester United Gas Company." He desired to thank the Chairman and Directors for the very kind way in which they had received the members, and for the handsome manner in which they had been entertained. The members of the Manchester Institution were exceedingly pleased to visit Chester, to do honour to their President (Mr. Belton) on his native heath. He (Mr. Newbigging) was sure that those who had availed themselves of the privilege of visiting the gas-works that morning were pleased that they had done so. There was abundant proof there that the Company had been, and were now being, well administered and capably engineered. If proof of his assertion were necessary, he need only refer them to a recently published analysis in the "Gas World." He proposed to quote only one or two extracts; and against these figures he had placed those of the Sheffield undertaking. He did not think anybody, or any engineer, would cavil at being compared with Sheffield, which, to his mind, was the best-managed company in England. The cost of gas into the holder at Chester for last year was only 7·8d. per 1000 cubic feet; and another remarkable feature in the accounts was the quantity of coke sold per ton of coal carbonized. These figures were highly creditable to their President. He had been informed that, in spite of keen competition with electricity, the demand for gas in Chester was still increasing. And this fact must be borne in mind—Chester was not by any means a manufacturing centre. Fifteen years ago, the consumption of gas was 220 millions; but this year it would approach 300 millions—showing an increase of something like 36 per cent. Considering that during this period of fifteen years the severest competition with electricity had been felt, he regarded the figures as very satisfactory. He should like members to consider what had been the principal contributory causes to the success of the Chester gas undertaking. In the first place, they had a very capable



The Interior of the Sulphate House.

Board of Directors, consisting of well-known Chester men; and he (Mr. Newbigging) was very pleased to know that in Mr. Cullimore they had a gentleman who was also an Under-Sheriff of the county. He and those who were associated with him had made the undertaking successful by reason of the fact that they had brought into application those commercial abilities which had stood them in good stead in other spheres of general business transactions. The shareholders of the Chester United Gas Company were to be congratulated on having their moneys in such intelligent keeping; and the Company's consumers should appreciate the fact that they were excellently catered for. The Company were, he believed, among the first to adopt the profit-sharing system. This was very creditable to the Directors; and he (Mr. Newbigging) only hoped that other gas companies and municipalities—[hear, hear]—would follow suit, because he believed that the system was the panacea for labour troubles. He assured the Chairman that the members had thoroughly enjoyed their visit to the gas-works. He had the greatest pleasure in proposing the toast, coupling with it the names of Mr. Cullimore and Mr. Frederick Pye, the Secretary and General Manager.

Mr. CULLIMORE, in responding, said it had afforded the Directors the greatest possible pleasure to entertain the members of the Institution. His colleagues were satisfied that gatherings of this nature were beneficial to all concerned in the profession. It was good for them, as proprietors, to have in their company gas engineers from other districts; and nothing but good could result from such friendly intercourse and exchange of opinions. He assured the members that the Directors would be pleased and gratified when they heard the eloquent testimony to the work of their Engineer—testimony of a character which was convincing when it came from an Engineer of the standing of Mr. Newbigging. They, of course, in Chester, could not hope to compare favourably with undertakings in the large and populous



The Purifier House and "Solvene" Washer.

towns; but he thought that, under the guidance of Mr. Belton, they were conducting their business in a progressive and up-to-date manner. If the members, during their inspection of the works, had been able to impart words of counsel or apply criticism, he was sure that all would be taken in good faith and in a pleasant way. [The PRESIDENT: "Hear, hear."] He knew he could answer for Mr. Belton's feelings on that question. He was sure that criticism would not hurt him. [Laughter and applause.] He (the speaker) was delighted that the members had accepted the hospitality of the Directors, and assured them of the honour they had conferred upon their city by electing Mr. Belton as their President.

Mr. F. A. PYE, who also responded, said that he looked upon the Manchester District Institution of Gas Engineers as being one of the best business-managed institutions in the country. It was not only composed of men of scientific intellect, but comprised men of business instinct and principle; and he had not come across such combinations in any other organization. It was greatly due to the foresight of the prominent members of the Institution that they possessed that most useful branch, the Commercial Sections. He believed this idea was first mooted in the Manchester Institution, and he was convinced that it had been one of the primary causes of the success which had been achieved, not only by the Chester Company, but, practically speaking, by all progressive gas undertakings.

Mr. BELTON thanked the speakers for their kind words relative to the sterling business qualities of, and the excellent results achieved by, the methods of their Institution regarding commercialism. There was no doubt that the influence of the Manchester District upon national gas matters was very great. He almost felt tempted to say that this influence was far ahead of that of any other kindred Institution, outside the parent one. Really, he thought the Manchester Institution was, apart from the Senior Institution, the premier association of its kind in the country. After paraphrasing the old saw that "What Lancashire says to-day the whole of the country will do to-morrow," Mr. Belton spoke of some of the results achieved by the Manchester Institution during the last few years. Manchester's lead had, he said, been followed in many ways; and he was heartily glad of it, because it was all for the betterment of the industry with which they were so closely connected. The advertising section of the British Commercial Gas Association was, to his mind, doing splendid work in advertising the use of gas for domestic purposes throughout the country. So far as he (the speaker) could see, there was scarcely a paper of importance in the country which did not contain an advertisement relative to the advantages of using gas—be it "Punch," one of the popular magazines, or even the "Daily Mail." [Laughter.] The President concluded by stating that he would be wanting in gratitude if he did not express his deep sense of obligation and thankfulness to the Directors of the Chester Gas Company for their kindness in entertaining his colleagues that day. For the moment, he begged to dissociate himself from the Company of which he had the honour to be the Engineer, and to speak as a member of the Institution. He desired to convey to Mr. Cullimore, and, through him to the Board, the gratitude of the members of the Institution for the kindly way in which hospitality had been extended to them that day. He also desired to thank Mr. Newbigging for his kind words about the Chester works—an appreciation which was valuable from so eminent an authority. A good deal had been said about the prosperity of the Company, and his services as Engineer; but he was not unmindful of the fifty years' record of Mr. James Pye, and of his valuable work in connection with the undertaking. He was sure they had a worthy successor in Mr. Frederick Pye. To him a great deal of the prosperity of the Company was largely due—perhaps more largely than to engineering management. There was an old saying that the profits of a gas company were made in the retort-house. To some extent this was true, but not altogether. If the general business of the concern was not conducted upon right lines, and conducted wisely and discreetly, its prospects and prosperity suffered. He did not think any company in the country was served with more discretion or care, or had achieved greater success in the administration of the secretarial and general-managing department, than the Chester Company.

The proceedings then terminated.

### VISIT TO EATON HALL.

The members subsequently visited Eaton Hall, the seat of the Duke of Westminster; special arrangements having been made for the party to inspect the palatial building and conservatories.

Tea was partaken of at a picturesque spot on Deeside, at the invitation of the President and Mrs. Belton.

Mr. E. ALLEN (Liverpool) proposed a hearty vote of thanks to the host and hostess, and assured them that the visit had proved a most delightful one.

Mr. SAMUEL GLOVER (St. Helens) cordially supported the motion, which was carried enthusiastically.

The PRESIDENT, in responding, said he was deeply grateful for the many kind words used in regard to him that day. He only wished he felt that he deserved them. He assured the members that it had afforded Mrs. Belton and himself the greatest possible pleasure to have the privilege of entertaining them.

The party returned by steamer to Chester, arriving there in ample time for members to secure their various trains. The whole of the arrangements were excellently organized by the indefatigable Hon. Secretary of the Institution, who was unsparing in his efforts to ensure the comfort of his colleagues.

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A week-end excursion, from the 4th to the 7th of July, has been arranged by the Junior Institution of Engineers to Brussels, for the purpose of visiting the Ghent Exhibition. The party will be leaving London on the Friday, and will visit the Exhibition the following day. The remainder of the time will be devoted to excursions and sight-seeing.

## DETERIORATION OF COAL IN STORE.

In some interesting "Reflections" contributed by M. André Grebel to the number of the "Journal de l'Eclairage au Gaz" for the 20th ult., he refers to a note by M. Winckler, in the "Bulletin des Ingénieurs" for March on the subject of the deterioration of coal in store.

The author studied, under ordinary conditions of working, the yield of gas and its illuminating and calorific powers of four deliveries of English coal from the same field, in periods of more than ten days, extending to the second and even the third month. He found the deterioration to have been as follows:—

| Coal. | Period of Observation. | Percentage Lower Yield of Gas per Cubic Metre per Ton. | Percentage Lower Illuminating Power, in Carcels. |
|---|---|---|---|
| A | First to second month | 0·7 | 3·9 |
| B | First to second month | 2·6 | 3·5 |
| C | First to second month | 0·9 | 2·6 |
| C | Second to third month | 2·2 | 3·3 |
| C | First to third month | 3·1 | 5·9 |
| D | First to second month | 0·9 | 2·6 |
| D | Second to third month | 2·9 | 9·7 |
| D | First to third month | 3·8 | 12·3 |

M. Grebel points out that all the coals were English, and had been subject to deterioration at the pit's mouth, and during their transit by sea.

As the result of his observations, M. Winckler came to the conclusion that the average loss of volumetric yield at the end of the first month was from 1 to 1½ per cent. It increased from the second to the third month, and possibly in the months following, though beyond a certain maximum it would drop and approach zero. His investigations enabled him to assert that, by increasing the period of storage, coals not only lose their gas-yielding power, but also their light-giving qualities. The average loss in the latter respect at the end of the first month was from 3 to 3½ per cent. The close approximation of the figures for lots C and D is interesting, if it is borne in mind that in August and September the coal was taken from the stack in the open air, while in all the other cases it was entirely under cover. On the other hand, the three months for lot D correspond to the hottest quarter of the year. Consequently, the loss of 9·7 per cent. experienced from the second to the third month of storage is thoroughly justified, while that of lot C was only 3·3 per cent.

M. Grebel considers the figures arrived at by M. Winckler rather disconcerting, as they did not permit of his coming to the conclusion that the calorific power of the gas from sample B was 5430 calories per cubic metre in January and 5575 calories in February, while that of sample C was 5616 calories in May, 5605 calories in June, and 5775 calories in July. He thinks the author must have used, as he did in his first study of the fluctuations in production, a "Sarco" calorimeter, which belongs to the class of registering thermometers that are heated by a flame of the gas to be tested, and the indications of which have no precise relation to water-circulation calorimeters or calorimetric bombs. He does not state whether or not he measured the illuminating power by the Dumas and Regnault photometer; but M. Grebel supposes that he did not use the Giroud jet photometer, which favours poor gases. At the same time, he considers that the investigation undertaken by M. Winckler, who is a young French gas engineer having considerable experience in the manufacture of town gas, deserves attention.

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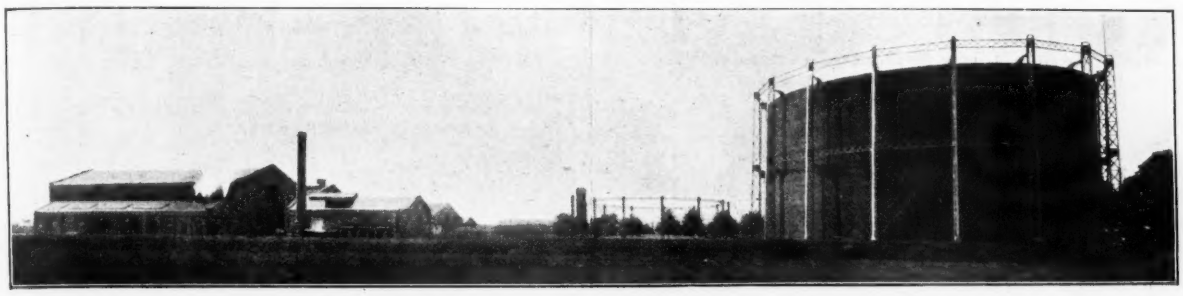
**Junior Institution of Engineers.**—On the 29th anniversary of the foundation of the Junior Institution of Engineers—on Monday, the 30th inst.—at the Institution of Electrical Engineers, Victoria Embankment, the second Gustave Canet Lecture will be delivered by Dr. Dugald Clerk, F.R.S., who has chosen as his subject the "Working Fluid of Internal Combustion Engines."

**Pitting of Steel Pipes.**—The subject of the pitting of steel pipes by mill scale has been dealt with by Messrs. G. C. & M. C. Whipple in "Engineering News" [see Vol. LXVIII., p. 856]. It is known that accelerated corrosion tests of iron and steel by exposure to strong acids are of small value as an indication of their probable behaviour in actual service. Steel pipe-lines usually fail on account of pitting, which ultimately leads to holes and leaks. Mill scale is an important factor in pitting, as is shown by the fact that steel plates which corrode badly when this scale is left on do not pit seriously after the scale is removed. Galvanic survey of the mill scale gives materially different results for wrought iron and for steel, and indicates a much greater homogeneity of the wrought-iron scale. Electrolysis tests show that wrought iron has a less tendency to pit than steel. Copper steels corrode much more slowly than ordinary steels in strong acids, but behave very similarly in water. Since copper does not change the electrical conditions of the scale, it does not affect the tendency to pit. Protection against pitting is best attained by the removal of the scale; but since this is an expensive process, it appears that some effort should be made to decrease the scale during manufacture, or make it more easily removable, so as to improve its electrical condition.

# A FULL DAY IN THE CITY OF GLOUCESTER.

**By Members of the Midland Association of Gas Engineers and Managers.**



A GENERAL VIEW OF THE GLOUCESTER GAS-WORKS.

THE outing of the members of the Midland Association of Gas Engineers and Managers was made this year to the historic city of Gloucester, where, as Engineer to the Gas Company, and as successor to his father, Mr. W. S. Morland, the President of the Association, daily exercises his energies, as he has done for many years past. The visit took place last Thursday. The majority of the visitors made Birmingham their matutinal *rendezvous;* and they left there by the 9.35 train on the Midland Railway. Gloucester was reached before eleven o'clock, at which hour brakes left the station for the gas-works. Passing through the city, the members saw something of its daily life; and when they got on to the (what seems to be) almost interminable Bristol Road, they saw too the exteriors of many large establishments in which are carried on the industries which are of the very life and blood of the city. They passed on until, after they had quitted the tram-railed streets of the city, they saw in the distance nestling in the rural solitude of Hempsted the gas-works which were to be, according to programme, the object of primary attention. The President had been to the station to meet his "flock," which included the new Hon. Secretary (Mr. W. W. Townsend, of Hereford). Well before the time appointed, the Deputy-Chairman of the Company (Mr. J. H. Jones), and his directorial colleagues, Mr. T. S. Ellis, J.P., Mr. J. M. Collett, and Mr. George Aldridge, with the Secretary (Mr. W. E. Vinson), and the Assistant Engineer (Mr. W. E. Tew), were all there to greet the visitors. It was found with regret that the business-pressure upon the Chairman (Mr. R. V. Vassar-Smith, J.P.) prevented his presence. However, his deputy filled the part of chief representative of the hosts with a distinction that it would have been hard to equal, let alone beat; and, throughout the day, he and his colleagues were with, and at the disposal of, their visitors. If the latter enjoyed their day at Gloucester, the former, it was plain, found equal enjoyment and satisfaction in having them there.

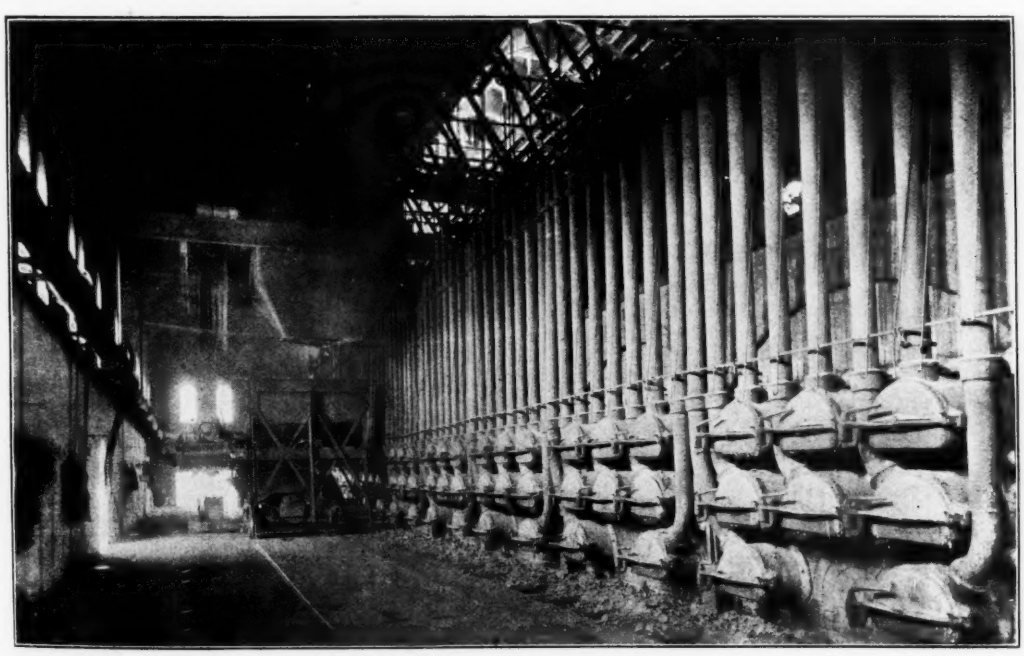
The party all told numbered between sixty and seventy—nearer the latter figure than the former; and the first visit was to the station-meter house—not to inspect the meters or the well-kept interior, but to indulge in a little light refreshment after the early journey. The day was charmingly fine—and (welcome it was) a trifle cooler than the day or two preceding. Just outside the meter-house, when all had "refreshed," the Deputy-Chairman said he was not going to take up time speech-making; but he must say the Directors of the Company were very pleased indeed to see the members of the Association there. They recognized that they were present to do honour (as they all wished to do) to their President, Mr. Morland, for whom the Board and all connected with the Company had the greatest respect. The Board were glad indeed to have the opportunity of helping in the entertainment of his professional friends. His colleagues and himself would do all they could to help Mr. Morland in making the day a pleasant one. Their hope was that lasting good impressions would be formed of Gloucester, and that their visitors of that day would be seen there again.

## A DESCRIPTION OF THE WORKS.

The President had prepared for publication the following notes concerning the works; and supplement to them will be found in his Presidential Address to the Association in February last [see "JOURNAL," Feb. 25, p. 530].

The works are pleasantly situated in the country, about two miles from the centre of the city, on the main road to Bristol and the West of England. The area of the property is about 12 acres, which leaves plenty of space for future extensions. For many years past the Company have laboured under the disadvantage of not having a railway siding into the works, and coal has had to be hauled a distance of 1½ to 2 miles; at the present time, it has to be hauled about ½ mile. We understand that this state of affairs is about to be remedied by the provision of a siding. The Gloucester and Berkeley Canal runs adjacent to the works and a certain amount of coal is brought in by water.

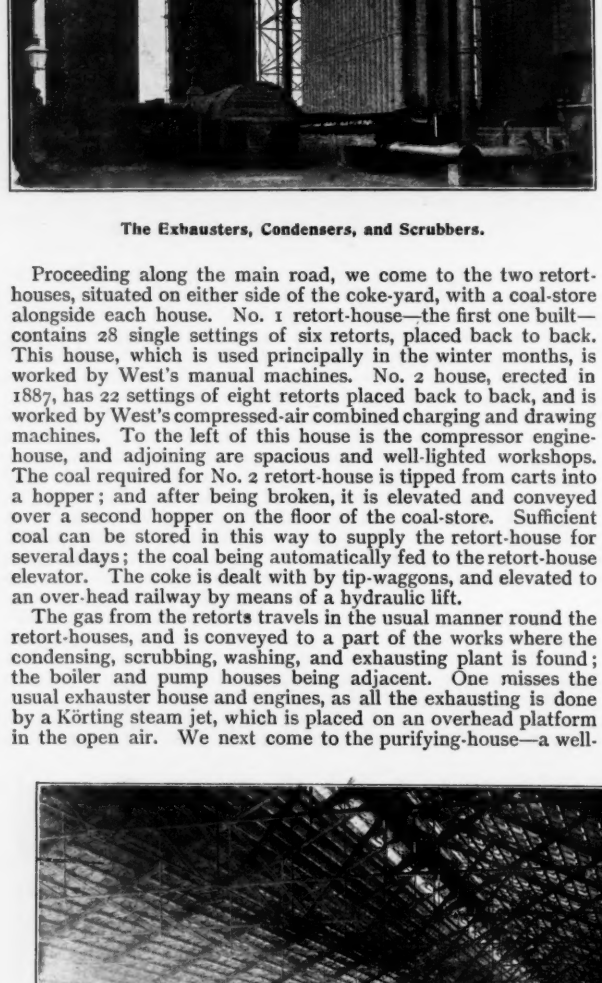
The land was purchased about 1872; and the present works were designed and laid out by the late Mr. Robert Morland. Previous to the construction of the gasholder tanks, borings were made to ascertain the nature of the subsoil, which was found to be blue lias clay. The spoil from the excavation for the tanks,



INTERIOR OF No. 2 RETORT HOUSE, GLOUCESTER GAS-WORKS.

instead of being carted away, was therefore made into bricks on the spot; and these bricks were used for the construction of the works—the surplus being sold. As the field was below flood level, the top soil was used to raise it.

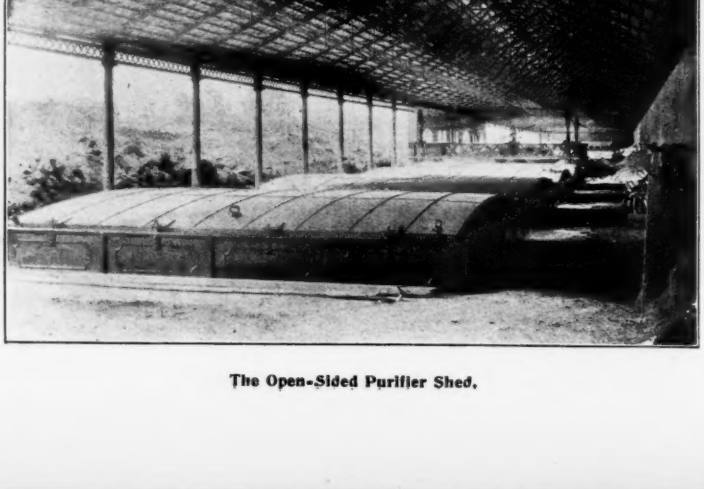
On entering the works gate, there is found on the right-hand side the weigh office and on the left the governor houses, laboratory, and testing plant. The main road into the works is substantially paved with granite setts; and on either side limes are planted. The three gasholders erected each side of the road have a total capacity of 2¼ million cubic feet.



**The Exhausters, Condensers, and Scrubbers.**

Proceeding along the main road, we come to the two retort-houses, situated on either side of the coke-yard, with a coal-store alongside each house. No. 1 retort-house—the first one built—contains 28 single settings of six retorts, placed back to back. This house, which is used principally in the winter months, is worked by West's manual machines. No. 2 house, erected in 1887, has 22 settings of eight retorts placed back to back, and is worked by West's compressed-air combined charging and drawing machines. To the left of this house is the compressor engine-house, and adjoining are spacious and well-lighted workshops. The coal required for No. 2 retort-house is tipped from carts into a hopper; and after being broken, it is elevated and conveyed over a second hopper on the floor of the coal-store. Sufficient coal can be stored in this way to supply the retort-house for several days; the coal being automatically fed to the retort-house elevator. The coke is dealt with by tip-waggons, and elevated to an over-head railway by means of a hydraulic lift.

The gas from the retorts travels in the usual manner round the retort-houses, and is conveyed to a part of the works where the condensing, scrubbing, washing, and exhausting plant is found; the boiler and pump houses being adjacent. One misses the usual exhauster house and engines, as all the exhausting is done by a Körting steam jet, which is placed on an overhead platform in the open air. We next come to the purifying-house—a well-



**The Open-Sided Purifier Shed.**

**The New Range of Workshops.**

ventilated building, 160 yards long, which contains a set of four 20 ft. by 20 ft. boxes, and a set of four 30 ft. by 25 ft. These are all on the ground level; and there is ample room provided for storing and slaking lime, which is solely used for purifying. The meter house—a lofty building—contains two meters, one dated 1877, which we understand is the year when gas was first made at these works. The meter is able to deal with 40,000 cubic feet of gas per hour; while the other (dated 1891) has a capacity of 60,000 cubic feet per hour. The Engineer's offices adjoin the meter-house. The two governor-houses contain one 24-inch governor, one 30-inch, and a 12-inch safety governor. The Company have for many years manufactured sulphate of ammonia. The boilers which supply steam for this plant also supply the engines for the coal breaker and compressed-air stoking plant for No. 2 retort-house, as well as power for the workshops. All the boilers on the works are fitted, with steam blowers, and steam is raised by means of coke breeze. The present price of gas to ordinary consumers in Gloucester is slightly under (with the 5 per cent. discount) 1s. 9d. per 1000 cubic feet.

## Notes by the Way.

In passing round the works, the favoured position of the Company in respect of land was observed; and though for long there has been the cartage trouble for coal and other material (though use has been partly made of the canal), it is seen, now railway lines are in such proximity to the works, that there will not be any great engineering difficulty in carrying out the project of building over-head sidings and bringing the coal direct into the works, and so saving money. Talking of coal, when standing over the coal-breaker, at which point the siding will end, the President told how he had experienced very little trouble with the heating and spontaneous combustion of coal, since he had, in stocking coal, allowed each fresh layer time to cool off. But one visitor asked how Mr. Morland would manage this in a larger works where there was no time to cool off the coal before accepting a fresh delivery; and he had to confess that the Gloucester preventative of trouble could not be applied in such a case. He also pointed out, with reference to the depreciation of stocked coal, that some that he used at the time of the last strike had not been disturbed for twenty years. The gas-producing depreciation he found was only about 10 per cent., compared with freshly wrought coal, after this long period, which proved to him that depreciation is a diminishing quantity.

The fine new range of workshops was seen, and these Mr. Morland is going to have equipped with power machines and tools. The works are largely self-contained, as Mr. Morland believes in an engineer, his staff, and men doing as much as possible in the works, instead of letting it go elsewhere. He was trained to this years ago, when his father made the bricks on the works with which the buildings were constructed, and did it—producing a good strong brick—at a cost of 14s. to 15s. per 1000. The whole of the building work, as well as the construction of the retort-settings, is done by the Company's own men. The subject of brick retorts was a topic of conversation in the retort-houses. Mr. Morland favours brick-built retorts, with stopped ends. The retorts were all in good shape, and heats excellent. He pointed to the convenience in repair work of the brick retort, and this led one inquirer—a wag he must have been—to ask how much of the original retorts was left now. For pointing-up, Mr. Morland does not believe in patent cements. He mixes a little common salt with ordinary material so as to get a flux; and he does not find the slightest difficulty. In the purifying-house, when talking of the adherence to lime purification (though there is a difficulty here in getting rid of the spent material) Mr. Morland pointed to the low price at which the Company are now selling gas—1s. 10d., less 5 per cent.—and to the fact that the gas is 16¼-candle

power, tested by the No. 1 burner, and only contains about 12 grains of sulphur. The Company want to keep up a good reputation for good quality as well as low price. In these few facts of leading importance, Mr. Morland has his answer to all references to walking in the ways of old practices. A point of much interest was the use of a Körting steam-jet exhauster, and Mr. Morland found his friends sharply inquisitive; but long experience was able to give an answer to all points. He believes that the failure of this type of apparatus at other works has been due to the fact that usually it has been fixed immediately after the hydraulic mains or condensers. The success at Gloucester is due, he believes, to the steam-jet exhausters being fixed after all the plant save the purifiers, and having further condensing power following the steam-jet exhausters to condense the steam. With reference to steam, the President has a liking for plenty of steam producing capacity; and in raising it he uses poor fuel, with a large grate area.

It was altogether a most interesting visit to Gloucester, as the members were able to see the actual plant from which the President has derived the experience which supplied him with the subject-matter for the address with which he inaugurated his year of office. The inspection ended in the governor-houses, in which one heard of the value of having a safety governor in addition to the ordinary ones.

### Visit to the Cathedral.

There was a little vacant time between the completion of the inspection of the works and the hour appointed for lunch; and the President suggested that it might be pleasantly occupied by a visit to the Cathedral. No sooner suggested than the party were on the way to explore as much as possible of the ancient and magnificent pile. From some parts of the Cathedral, visitors are being excluded, on account of certain disgraceful proceedings the perpetrators of which have no respect for sacred, public, or private property; but through the influence of Mr. J. H. Jones, the members were all allowed to wander through the otherwise closed cloisters, the matchless beauty and excellent preservation of which are so widely acknowledged; and they form one of the chief features for pride among the citizens. The time spent there was as time passed from the outer world, and in touch with long past ages. But the programme was insistent; and all too soon the visitors were again passing through the daily life of the city, and on to the Bell Hotel.

### Luncheon and Toasts.

The card of invitation stated that the Chairman, R. V. Vassar-Smith, Esq., and the Directors of the Gloucester Gas Company requested the pleasure of the company of the recipient at a luncheon at the Bell Hotel.

At the festive board perhaps more than at any time during the day, there was regret that Mr. Vassar-Smith was not presiding; but a more charming deputy and representative of the hosts than Mr. Jones there could not have been. He was genial; his speeches bright and telling. The good things provided by the hospitable Bell Hotel were very thankfully received after the morning's outing. As the enjoyment of the hour proceeded, it was noticed that to the left of the Chairman were the President of the Association, the Senior Vice-President of the Institution of Gas Engineers (Mr. Edward Allen), the Vice-President of the Association (Mr. W. J. R. Baker, of Malvern), and the Secretary (Mr. W. W. Townsend). The Deputy-Chairman's before-mentioned colleagues—Messrs. Ellis, Collett, and Aldridge—and the Secretary of the Company (Mr. W. E. Vinson)—were also there. Among the prominent guests were included the Mayor (Mr. Councillor James Bruton, J.P.), the Town Clerk (Mr. George Sheffield Blakenay), the General Manager of the Gloucester Railway Carriage and Waggon Company (Mr. J. J. Steinitz), the Secretary (Mr. Beach), and the President of the Traders' Association (Mr. H. A. Dancey). The President's neighbour (Mr. R. O. Paterson, of Cheltenham) was also at the top table.

After lunch, there were a few toasts; but before they were taken, the Honorary Secretary alluded to the apologies he had received for non-attendance. At the same time, he remarked that it must be gratifying to the President to see such an excellent muster there, notwithstanding the distance that the majority of the members were situated from Gloucester.

After the loyal toast,

Mr. Edward Allen (Liverpool) proposed the toast—"The City and Trade of Gloucester." He remarked that it had given him great pleasure to be present that day, in one sense representing the Institution of Gas Engineers, as well as the important branch—the Midland Association of Gas Engineers and Managers. Apart from his positions in these organizations, it had given him and all others there great personal pleasure to be present, in order to, so far as he possibly could, show his friend, the Engineer of the Gloucester Gas Company, how much they all individually appreciated him. He was one of their colleagues whom they admired exceedingly for his personal character; and that day they had had an opportunity of seeing and admiring the works which accounted for the good results that he obtained. Mr. Morland must have an excellent Chairman and Board who enabled him to carry out such work. Regarding the toast that had been entrusted to him (Mr. Allen), they were present as the guests of the Gas Company in the City of Gloucester; and therefore it would meet with the warm approval of all to drink to the health, success, and prosperity of the city. This was his first visit to the city; and the words of Charles Dickens, that it was "a wonderful and misleading city," somewhat represented his feelings. He (Mr. Allen) had had the pleasure of seeing two great institutions that day—one was mentioned in a little book sent to him by Mr. Morland—the other was not. The Cathedral was mentioned, and some of them had walked round and admired its wonders; and the impression made upon their minds was a lasting one. The other institution not mentioned in the notes was the gas-works; and it was one of the finest practical institutions with which those present were acquainted. Proceeding to refer to the importance of the commercial work of the city, he pointed out that one of the "misleading" features referred to by Dickens was that it was a port. They were all glad to know that Gloucester was flourishing commercially. He associated with the toast the name of His Worship the Mayor.

The Mayor (Councillor James Bruton), in reply, said Mr. Allen had given him a great shock when he said that he had been led to believe that in Gloucester there was nothing very remarkable. The citizens held a very different opinion. They believed if there was one bright spot in this part of the country, it was the city in which they were assembled. Mr. Allen had referred to the appearance of the city. He (the Mayor) thought that they in Gloucester might fairly congratulate themselves on what they had to show their visitors. The citizens were enterprising and up-to-date; and he believed their visitors that day would come to the conclusion that it was a most progressive place. They did not get there those great booms of prosperity which some cities seemed to feel; but, on the other hand, they did not get those waves of depression. He alluded to the glories of the Cathedral, and mentioned that the cloisters were the most remarkable in the kingdom. Concerning the manufactures of the city, he was not going to refer to that of gas because he did not wish to show his ignorance before men who were technically acquainted with the subject. The prosperity of the city depended really upon the Gloucester Railway Carriage and Waggon Company. They could always approximately gauge the probable distress in the winter by the number of men engaged at the Waggon-Works. They would that afternoon see works that would fill them with admiration, and then the visitors would understand how it was the Waggon Company played such an important part in their prosperity. It was good of those present to have drunk his health. The Corporation he represented, unwisely no doubt, had omitted to acquire the gas-works of the city. That they should have acquired them those present would admit. As Mayor, he represented the principal competitor of the gas undertaking. But in Gloucester, the two concerns lived in perfect amity. There was ample room for both. As Mayor, he was sorry they had not practically the monopoly of all artificial lighting. As a shareholder of the Gas Company [Laughter], he had, on the other hand, a certain amount of satisfaction that this was not so, and as a shareholder he was glad the Company continued to prosper. It was an old saying that there were only two things certain in this world—death and taxes. There was another certainty, that the shareholders of the Gloucester Gas Company would continue to receive their dividend in future. [Applause.]

The Chairman proposed the toast of "The Midland Association of Gas Engineers and Managers." Speaking on behalf of the Directors of the Gas Company, he said he could assure those present that it was a great pleasure to see them, and the pleasure was enhanced by the fact that they had come to the city to honour their President. They all in Gloucester thought very highly of Mr. Morland; and when they found gentlemen from all parts of the Midlands coming to do honour to him, they felt also it was some recognition of the claims of Gloucester, and of the good citizens. The Directors regretted that their Chairman (Mr. Vassar-Smith) was not present. He was a gentleman of whom they all thought a great deal. When he mentioned that Mr. Vassar-Smith was the Chairman of Lloyd's Bank, they would recognize that his position was not purely local. The Company who possessed him as Chairman were bound to do well; and they all considered their Gas Company was particularly well managed. In referring to the Association, he said that one recognized how Associations of this sort were becoming more and more general in every profession and trade; and one also recognized, by the visit paid that morning, that people in the same branch of work could obtain a great deal of benefit by seeing what others were doing. A great thing in business was to carry it on well and persistently; and, in the end, the careful and methodical way would probably be as successful as the brilliant manner in which new ideas were always being introduced rather than the everyday work conducted. They might congratulate themselves that the gas industry of the country was, on the whole, a very sound one. He did not know that they ever heard of a properly established gas company going into liquidation. All shareholders seemed to receive their dividends with a regularity equal to that of the best managed businesses in the country; so that the shareholders were always well looked after in gas companies. He thought those present would agree that this should make gas companies think of their employees as well as their shareholders. Gas companies were not subjected to that unrestricted competition in which the people of this country generally seemed to delight. Gas companies were in the nature of monopolists in gas supply; and therefore they were in a position to consider their employees in the ordinary way of business. The directors of all gas companies ought to see whether they could not do something to put their employees in a more favourable position than other employees. He thought Sir George Livesey would live in the memory of all; and he believed no gas company would go wrong in following his example. At Gloucester, they had been immensely pleased with the co-partnership scheme. It was a system which made employees take a personal interest in the conduct of the business. If they could brighten the daily round and the common task of their employees, if they could invest them with interest, if they could make the men feel that it was worth while to use brain as well as hand, they were doing well for the industry. He was pleased to find gas companies were more generally adopting the system; and he hoped the time would come when they would all have adopted it. At Gloucester, they started the scheme when gas was selling at 2s. 3d. per 1000 cubic feet; and the increase in the employees' bonus was equal to ½ per cent. for every penny reduction in the price of gas. Now the price of gas was 1s. 10d.; so that the employees got 7½ per cent. on their wages. If the Directors could go down lower in price, the consumers, shareholders, and employees would all be glad. At Gloucester, they were proud of their 1s. 10d.

He believed there were only four companies in England who were selling at less. If the Company could reduce the price still further, they would all be pleased. The President and the Secretary were more particularly the authors of the 1s. 10d. Concluding his remarks, Mr. Jones said he hoped the Association would have an extended sphere of usefulness. Presidents like Mr. Morland would do all they could to help the organization along to that end. On behalf of the Company and of those present, he wished Mr. Morland a long life and a happy one, and trusted that he would long remain a member of the Association.

The PRESIDENT thanked the Deputy-Chairman most sincerely for the very kind remarks he had made in proposing the toast. The Association was one of ten scattered over the United Kingdom and Ireland. The object of the Associations was to bring the members together two or three times a year, when all matters concerning the gas industry could be discussed. Papers were read, and debates took place; and members freely discussed, one with the other, any recent improvements which might have been introduced into the works of which they had charge. As there was not the same necessity in the gas industry as in many other industries for keeping secret any discovery which might reduce the cost of production, members were perfectly frank one with the other; and therefore the gas industry generally benefited very considerably from the meetings. He must thank his Directors for the very kind way in which they received the news when he informed them that the Midland Association had honoured him by electing him their President. The Board at once said they would be pleased to invite the members to Gloucester. The Company had always been fortunate in having a good Board of Directors; but he ventured to say there had never been a better Board than the present one, and under which he was proud to serve. The prosperity of the Company he was sure was largely due to their having had good, sound business men as Directors. He again thanked the Deputy-Chairman for the kind terms in which he had submitted the toast.

Mr. R. O. PATERSON (Cheltenham) proposed the toast of "The Chairman and Directors of the Gloucester Gaslight Company." He remarked that those present all realized how correctly the Deputy-Chairman had grasped the main objects of the Association. Their chief object was, of course, the interchange of knowledge, and that was what had brought them to Gloucester. For the kindness of the Chairman and Directors of the Company, the visitors could not be too grateful. The Association had been received with the utmost earnestness and hospitality; and therefore the members owed the Directors of the Company a deep debt of gratitude. The members honoured their President; and it was particularly gratifying to them to know he was appreciated by his Directors. In the speech they had just heard from Mr. Jones, there were remarks which would appeal to many of them—particularly in reference to the scheme of co-partnership. There was something very attractive in this; and it was to the credit of the Gloucester Gas Company that they had been pioneers in this matter in this part of the country. They might all be encouraged to consider the scheme in the future. Might he make one suggestion. He understood that the scheme did not include the staff of the undertaking. The workmen had been brought in, but the officials had been omitted. In his opinion, this was a mistake. They should all be co-partners. The position which he (Mr. Paterson) occupied that day produced many reminiscences. When he came to the neighbouring town of Cheltenham, 43 or so years ago, the only man in this part of the world he had any right to know, or had any suspicion of knowing, was Mr. Robert Morland, their President's father. He (Mr. Paterson) did not take long to find him out. One of the first friends he then made was the President, who was at the time extremely youthful. He (Mr. Paterson) had watched his career ever since; and he could say, with a great deal of confidence, that, from his first appearance in the service of the Company, he had been a credit to both his parents and the Company. For their hospitality and kind entertainment, the members wished to convey to the Chairman and Directors of the Company their heartfelt, grateful thanks. With the toast he associated the name of Mr. T. S. Ellis, whom he had known for many years.

Mr. T. S. ELLIS, in responding for the Chairman and Directors, said the reply should really have come from the gentleman who was occupying the chair in the absence of their Chairman, whom they looked up to with so much esteem. The Board had had very great pleasure indeed in inviting the Association to Gloucester as their guests; and they were guided in this largely as it presented to them the means of expressing their congratulations to Mr. Morland on the honorable position he occupied. He thought it was possible too that they were guided by some little pride, that such a high compliment had been paid to one of their officers, which somehow or other seemed to involve a very high compliment to the Board. Anyway, they might be pardoned if they viewed it in this light. They were heartily glad to see the members, and hoped the remainder of the day would be as pleasant as the first part. Speaking to an assembly which was composed of gas engineers and managers, he was sure they would agree that manufacture was not by any means the whole business in gas supply. There was management. The Deputy-Chairman had alluded to this; and he was sure Mr. Morland and all connected with the Association would acknowledge how much they owed to management. Their Secretary (Mr. Vinson) had spent 34 years in the service of the Company, and he had done much in the management. As one who had been a Director for many years, he (Mr. Ellis) could say that the Directors also played a useful part. They brought intelligence to bear in looking at things from different points of view. On most points, they all agreed. One of them was that they desired to be on good terms with their employees—whether superior staff or rank-and-file. He was not letting out any secret when he said they were largely indebted to the Deputy-Chairman for the part he took in introducing the co-partnership scheme. There was another point on which the Board was very strong; and that was that they were the servants of the shareholders and trustees of their interests, as well as trustees of the interests of the public. It had also always been their wish to encourage a happy and good feeling with the Corporation. It would mean a great deal if there was any serious difficulty between two such public bodies.

Mr. J. FERGUSON BELL (Derby) said the visitors also desired to express their gratitude to Mr. Jones for the part he had taken in their reception and in the chair. The members of the Association were delighted with their visit to Gloucester. It was pleasing indeed to them to see the Gas Company and the civic authorities on such harmonious terms; and there could be no doubt the consumers were also well satisfied. While there were other towns with prices for gas as low as ruled at Gloucester, he did not know another one where it was so low for gas of such high quality. He was exceedingly pleased to hear the remarks of the Deputy-Chairman as to the introduction of co-partnership; for it was nice to know Directors who had such sympathetic feelings towards their employees. There was no question about it directors of gas companies had the opportunity of being model employers.

The CHAIRMAN thanked Mr. Bell for his kind remarks, and those present for heartily drinking the toast. He (Mr. Jones), however, was only one of a number; and he had not done anything more than the other members of the Board in the matter of the day's reception. While speaking, he should like to say there was one gentleman who had done a great deal for the Company, and towards the success of the day's outing. That was Mr. Vinson. The visitors were also much indebted to the Gloucester Railway Carriage and Waggon Company, whose guests they were to be that afternoon. Mr. Vassar-Smith was also Chairman of that Company. He was sure the visit to the works would be most interesting and pleasant; and he jocularly added that after it he was certain the members of the Association would send to Gloucester the orders for any waggons they might require. He proposed the health of Mr. Vinson and Mr. Steinitz, the General Manager of the Waggon Company.

Mr. VINSON, acknowledging the compliment, said that on the spur of the moment it was a little embarrassing for him to know what to say. He might perhaps, however, refer to his long connection with the Gas Company. He entered its service in 1867. At that time he was quite a lad; and he ultimately reached the position he was proud to occupy. He had worked under many Chairmen and Directors; and he had now a very happy and kind Board to meet. This he fully appreciated. As they all knew, the gas industry had gone through some trying periods of late, which threatened gas prices. The price of gas at Gloucester was very low now; but in looking at the minutes some time ago, he saw that at one period they were charging for gas 12s. per 1000 cubic feet. When he first became Secretary of the Company, the price was 4s.; to-day they were in the happy position of supplying at 1s. 10d., with a discount of 5 per cent. This would compare favourably with any town. Mr. Morland produced gas as cheaply as he could, and the Directors and officers sold it as cheaply as they could. They believed that cheap gas produced cheap gas. The business was increasing rapidly and satisfactorily; and there was hardly a house in Gloucester in which gas was not used for cooking. This was all due to cheap gas; and he felt sure it would not be long before they were able to further reduce the price.

Mr. STEINITZ, while thanking the Chairman and the visitors, thought it unfair for one or two reasons to expect him to make a speech on this occasion. In the first place, it was going to be his pleasure, in a very few minutes from then, to give the visitors a hearty welcome to the Waggon-Works. Then before an Association of Gas Engineers, it was very difficult for him to voice his views, because by profession he was an electrical engineer. However, he had come to the conclusion that gas and electrical engineers ought to be sitting together, instead of always being in opposition. Gloucester, which was enterprising in everything, was an example of how a municipal electrical undertaking and a private gas company could work harmoniously together. He also mentioned that he owed a vast debt of gratitude to an at-one-time member of the Association. He referred to the late Mr. Alfred Colson, with whom he worked for several years, and never regretted his connection with him.

### THE LATE MRS. HUNT.

Before the members left the table,

The HON. SECRETARY mentioned that, at the last meeting of the Committee, a resolution of condolence was passed with their highly esteemed member Mr. Charles Hunt, upon the death of his wife; and a letter was forwarded to Mr. Hunt. In reply Mr. Hunt asked him to kindly convey to the members his deep sense of their kind and very sympathetic letter.

### NATIONAL GAS EXHIBITION.

Correspondence that had passed between Mr. Walter T. Dunn and the Organizing Manager of the National Gas Exhibition, on the one hand, and the Hon. Secretary on the other, was also read. From this it appeared that Wednesday, Oct. 8, has been agreed to as being suitable for Midland-day at the Exhibition. It was suggested by Mr. A. T. Harris that if arrangements could be made so that they could take their respective Committees and Boards of Directors with them to the Exhibition that day, they might be assured that Midland-day would be a great success.

### THE GLOUCESTER WAGGON COMPANY'S WORKS.

The visitors left the Bell Hotel immediately afterwards, and the brakes which had been found so useful were again in attendance to convey them to the huge works of the Gloucester Railway Carriage and Waggon Company, Limited. At the entrance, Mr. Steinitz and his assistants took charge of the party in batches of ten; and the instructive perambulation of the place at once began. When it is mentioned that the ground occupied by the Company extends to 22½ acres, and that 1700 men are at present employed there, it will be recognized that the visitors only had a chance of seeing sample parts of the vast workshops in which the iron and steel work and beautiful woodwork are turned out, and assembled to form ultimately sumptuous and ordinary railway carriages either to the Company's own patterns, or to the specifications of customers. Also from wheel throughout, the less beautiful but equally useful railway waggons were seen in process of construc-

tion. All structural parts are made at the works; and some of the shops present, viewed from one point in each, a perfect maze of machinery, light and heavy, and furnaces and forges of all descriptions. The merry clang of hand hammers, the movement of heavy machine hammers, presses, shapers, and so forth, the whir of the lighter wood machinery, are heard on all sides. It is all an interesting spectacle to the uninitiated in the work; and as one passed through and saw the hundred-and-one parts of (say) a railway carriage, in the different stages of production, and their gradual assembling together, one felt much greater respect for these things, which are met with in every-day life, than one had before. It does not in an ordinary way strike the uninitiated that there is so much as there is in the organism of a railway carriage or waggon. Not only for home use is rolling stock produced at these works, but for distant places in the two hemispheres, and for people in high place carriages are made. To look at some of the carriages, railway travelling has been carried to a high state of refinement—for some people. It is no use attempting a description of what was seen, and the instructive things that were heard from the courteous and informative guides, as it would all take up much more space than can be devoted to it in these pages. But when about an hour-and-a-half had been spent in exploring the place, there was not an individual present who was not wiser than when he entered the gates of the vast establishment. Tea was kindly served in the offices; and there and then there was very hearty expression of the thanks that all sincerely felt to the Chairman and Directors of the Company, and to Mr. Steinitz and his assistants.

In proposing the vote of thanks,

The PRESIDENT said before the members parted, he should like to take the opportunity of sincerely thanking the Chairman and Directors of the Gloucester Railway Carriage and Waggon Company and their General Manager, Mr. Steinitz, for the hospitality and kindness shown to them that day. When he called upon Mr. Steinitz with reference to the visit, he received him most cordially; and he (the President) felt sure the visit would be a pleasant and interesting one. In this, they had not been disappointed. He was pleased to have had an opportunity of showing his friends from a distance that they could make other things than gas in Gloucester. He understood that the railway carriages and waggons made in the works went to all parts of the world. It might interest the members to know that the Waggon Company made a large number of the road vehicles used in the last Boer war, and that the vehicle used by Lord Roberts during the campaign was made in the works. It was on exhibition after the war, and appeared little the worse for the rough usage it had had, demonstrating that the work done by the Company was of the best. He again thanked the Chairman, Directors, and General Manager for their kindness.

There was hearty acquiescence in the Chairman's proposal.

Mr. J. A. MATTHEWS, Local Director of the Company, in reply, mentioned that he had travelled in many parts of the world in railway carriages made by the Company. Wherever he had been, he had heard them well spoken of; and he felt they deserved it. He was pleased to welcome the members of the Association to Gloucester.

Mr. STEINITZ also acknowledged the vote.

With this visit the long and full, but highly instructive and enjoyable, day ended; and there was then a splitting up into parties for trains having different destinations.

## SOME NOTES ON CARBONIZATION.

By ERNEST A. FRANKS, of Ferndale.

**[A Paper read before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, May 28.]**

It is with much diffidence that I venture to read the paper which is before you. So much has been written and said by the senior members of the gas industry on carbonization in general and continuous carbonization and carbonization in bulk in particular, and the whole ground has been so ably covered, that there is hardly room for a junior member, such as myself, to find fresh points to interest you. I had been cogitating as to the possibility of carbonization in bulk for some years before the installation of any plant on that system (so far as I am aware) had been adopted; but it was not until the summer of 1911 that I had an opportunity of carrying my idea into practice. The primary object I had in view was to reduce skilled labour in small works, such as my own, into unskilled labour, or, failing that, to reduce skilled labour to a minimum without the aid of machinery.

Without further labouring the matter, I will briefly describe the setting, and give you some of the results obtained. The setting, as working at present, consists of six chambers, 18 inches wide, set three back to back. Each chamber holds on an average 2 tons 15 cwt. of coal, and, at present, to each three chambers there is one furnace. The floor of the chamber is set at an inclination of 45° with the horizontal, and the top of the chamber at about 32°. So the coal at the front of the chamber is deeper than at the back. The opening for charging the coal is at the top and back of the chamber; the coal is thus enabled by gravity to fill the chamber. The front of each chamber is sealed by a sliding door working between channel-iron guides, which latter also serve the purpose of buckstays. The doors have half-inch play on each side; and this is luted with lime so as to form a gas-tight joint.

The top of the chambers is 15 feet above the railway, and to raise the coal for filling the chambers the following method is adopted. A steam-winch, which is also used for shunting purposes on the railway siding, is connected by two steel-wire ropes, passing over 18-inch pulleys fixed in the roof, to shackles fastened to a hopper holding 2 tons 15 cwt. of coal. The hopper can thus be raised or lowered at will. To fill the hopper, it is lowered to the side of the coal-truck, and when full it is raised to the roof. A bogey running on a gantry is then placed beneath the hopper, and the hopper is lowered to the bogey. One man can push the hopper; and he does so until the mouth of the hopper is above the charging door of the chamber. The coke from the chamber falls into a subway in front of the chamber, and is loaded by hand into the coke-barrows and thence wheeled to a steam lift and raised to the yard level. The gas is taken from each chamber through a 9-inch diameter pipe connected with the top of the old hydraulic main; and each chamber can be shut off by lowering a spindle which passes through the bridge pipe, and to the bottom end of which is attached a circular plate. This plate seats on to the top of the hydraulic main; the hole in the latter, for the passage of the gas, being only 7 inches in diameter.

Before proceeding to explain the method of working of the chambers, I will give a brief description of the furnaces. Each furnace is 4 feet square by 13 feet deep, and is charged from the top. The bottom of the furnace is constructed similarly to all deep fires, and the outlet for the furnace gases is 4 ft. 6 in. above the fire-bars at the back of the furnace. The reasons for constructing a fire of such a depth were two: (1) To secure, as far as possible, a constant depth of fuel between the furnace bars and the take-off for the furnace gases; (2) to do away with the necessity of looking after the fires should a stoker fail to turn in on any shift. The rule is that the furnace be kept filled and left full at the end of each shift; but it will run without attention, except, of course, occasional pricking, for a period of about sixteen hours. The furnace gases pass from the generators along flues to the chambers, which they heat somewhat after the manner of coke-ovens—the heating commencing from the bottom.

The working of the chambers is as follows: Each stoker does all the work in connection with charging, drawing, and handling of the coke of two chambers per shift, and is paid for this work 5s. per shift. From the appendix it will be seen that the cost per ton of coal carbonized for stoking, over a period of thirty weeks ended April 24 last, works out at 10·27d., or 0·94d. per 1000 cubic feet of gas made. The engine and boilerman works the winch for raising the coal and the winch for loading the coke into the railway truck. He also sees to the lowering of the valve on each chamber at the end of each period of carbonization.

One great advantage that I have found with chamber settings over horizontal settings is their mobility of production. Nominally the coal is carbonized in each chamber in from eighteen to twenty-four hours, and the number of charges are spread evenly over the twenty-hour hours, so as to maintain a uniform quality of gas. As, however, I have only storage for 90,000 cubic feet of gas in the gasholder and 40,000 cubic feet in compressed storage, whereas the maximum daily output is 200,000 cubic feet, arrangements have to be made in the winter time for not only having all the stock possible by Saturday evening, but for having the maximum make during the heavy lighting hours. To do this with the chambers, all that is necessary is to get the stock by 6 a.m. on Saturday morning by ordinary working, and then stand off until noon. It can be arranged to have all the chambers "off" by that time, and it is then simply a question of charging all the chambers as soon as possible, to have a production during the lighting hours of at least 50 per cent. above the normal. I may say that, as a matter of fact, the winter of 1912-13 was almost my first experience of a winter free from the fear of shortness of gas.

As wages are the important factor, and as my plant is worked under somewhat abnormal conditions, it is only fair that a slight description of certain wage-governing factors should be given. In the first place, the whole yard—ash-tip, coke yard, &c.—measures only 40 feet by 40 feet; so that it will be seen that when a pathway is left across the yard there is little room for coke storage. For this reason the bulk of the coke made has to be put in railway trucks as produced. As the railway is 10 feet above the yard level, machinery has to be adopted to fill the trucks. For a small works, a winch and tip hopper is probably the cheapest form of machinery—at any rate, a hopper holding 12 cwt. of coke, guided by channel-iron framing, and raised by a steam-winch erected on a platform 15 feet above the retort-house floor raises the coke to the required height, where it is tipped over a screen; the breeze coming back again through a shoot for boiler fuel. This handling of the coke is an item which would not arise were the yard larger.

The boiler and engineman's wages are 7s. per shift of seven days per week and twelve hours per shift. For this wage, in addition to the work already mentioned, he does the shunting, looking after the pump, putting-on and taking-off pressure, and working all engines. The wages paid to the boilerman and engineman are the same as were paid under the old conditions, and, since there are only two men for the twenty-four hours, no saving could be expected under this head.

The advantages that have accrued from the adoption of the chamber settings, as compared with the horizontal settings, may be summarized as follows:

1.—Reduction in number of stokers employed, with consequent saving in labour charges.

2.—Greater mobility in the production of gas, rendering the

punctual attendance of the stoker less a matter of importance.

3.—Being able, at almost any time, to increase largely the producing power of the chambers.

4.—The production of a coke of much greater value in South Wales than the ordinary gas coke.

5.—Considerably less room required for the chambers than for the horizontal retorts. The six chambers and two furnaces, over all, measure 20 ft. by 22 ft., and have produced 220,000 cubic feet of gas in twenty-four hours, and no alteration has been made in the structural building.

6.—Considerable saving in fuel in the furnaces and much more uniformity in the working of the same, and, as there are only two furnaces used in the winter, there must be very great saving in wear and tear.

7.—The repairs to the chambers must work out at considerably less than the repairs to ordinary retorts, and, what is more, such repairs can be carried out each year. The chambers are cooled without interfering with any other portion of the setting. Minor savings are lime for luting retort-lids, retort-house tools, shovels, &c., clearing ascension pipes, and other savings following upon these.

In the settings I have at present, there is room for many improvements, and I hope that they will be carried out; but from the experience I have had with the chamber as at present constructed, I unhesitatingly say that, in my opinion, chamber settings are an improvement on horizontal retorts.

In conclusion, I should like to mention a matter which, in my opinion, holds possibilities for chambers over ordinary retorts in small gas-works, and that is their continuous use in full working, winter and summer. To the small manager—and, I suppose, to the large one as well—lighting-up beds in winter and dropping them in summer is a worry which I have no doubt he would be glad to get rid of. On the same grounds the employment of the same number of stokers in summer as in winter, and the maximum use of all the plant of the gas-works, should prove of financial benefit. At any rate, the point I have in view is as to whether or no it would pay to produce coke—*i.e.*, furnace coke—and recover the bye-products in the summer months primarily to the production of gas. The surplus gas would, of course, be used in the furnaces.

I append results of a test of 12 tons 19 cwt. of coal on May 6; the samples of gas coal and tar being tested by Mr. Frederick Williams, M.A. (Oxon), F.C.S., of Aberdare, to whom my thanks are due. It should be mentioned that the coal carbonized was No. 3 Rhondda through coal, obtained from Coed Ely.

## Appendix.

The results of thirty weeks' working, ended April 24, 1913, are as follows:—

| | |
|---|---|
| Coal carbonized | 2637 tons 1 cwt. |
| Gas made, as per station meter | 28,346,800 cubic feet |
| Coke made (12·5 cwt. per ton of coal) | 1438 tons 5 cwt. |
| Coke sold | 1155 ,, 16 ,, |

Note.—The returns for coke made and sold are for six months ended March 31, 1913; the returns to April 24 not being obtainable at the date of writing the paper. The coal carbonized to March 31 was 2301 tons. All breeze used for boiler, and no account kept.

| | |
|---|---|
| Wages paid for stoking | £153 10s. 3d. |

From the above results, the following figures are derived:—

| | |
|---|---|
| Gas made per ton of coal carbonized | 10,760 cubic feet |
| Coke sold ,, ,, ,, | 9·3 cwt. |
| Coke sold per cent. of make | 80·36 |
| Labour on stoking per ton of coal carbonized | = 10·27d. |
| Labour on stoking per 1000 cubic feet gas made | = 0·94d. |

The tar produced during the March quarter of this year amounted to 11,551 gallons, or 10·153 gallons per ton of coal carbonized. An accident to the tar and liquor storage tank prevents my giving any return for the December quarter of 1912.

*Test Referred to.*

Test of 12 tons 19 cwt. of Coed Ely No. 3 Rhondda Coal.
Tested May 6, 1913.

Three chambers were used for the test, and charged every eighteen hours:—

| | |
|---|---|
| No. 1 chamber being charged at | 10 p.m. May 5 |
| No. 2 ,, ,, ,, | 4 a.m. May 6 |
| No. 3 ,, ,, ,, | 10 a.m. May 6 |
| No. 1 ,, ,, ,, | 4 p.m. May 6 and so on |
| Coal carbonized | 12 tons 19 cwt. |
| Gas produced | 139,700 cubic feet |
| Mean illuminating power | 14·1 candles |

*Composition of the Gas.*

| | Samples Taken at | | | | | |
|---|---|---|---|---|---|---|
| | 10 a.m. Per Cent. | 11 a.m. Per Cent. | 12 Noon Per Cent. | 1 p.m. Per Cent. | 2 p.m. Per Cent. | 3 p.m. Per Cent. |
| Carbon dioxide | 2·8 | 3·0 | 2·6 | 3·4 | 3·0 | 3·4 |
| Illuminants | 2·8 | 3·0 | 2·6 | 3·2 | 3·4 | 3·2 |
| Oxygen | trace | trace | trace | trace | trace | nil |
| Carbon monoxide | 7·3 | 6·6 | 6·5 | 6·1 | 6·1 | 6·8 |
| Methane | 25·5 | 25·8 | 26·3 | 26·4 | 26·5 | 26·0 |
| Hydrogen | 58·0 | 57·8 | 57·7 | 57·5 | 57·0 | 57·6 |
| Nitrogen, by difference | 3·4 | 3·6 | 4·0 | 3·3 | 3·8 | 3·0 |

(Signed) Frederick Williams, M.A. (Oxon), F.C.S.
May 10, 1913.

*Analysis of Sample of Coed Ely Coal.*

| | Per Cent. |
|---|---|
| Fixed carbon | 66·71 |
| Volatile matter | 27·80 |
| Sulphur | 1·14 |
| Ash | 3·2 |
| Moisture | 1·15 |

*Analysis of Tar.*

Specific Gravity, 1·13.

| | By Volume Per Cent. | By Weight. |
|---|---|---|
| Light oils up to 170° C. | 8 | 6·97 |
| Middle oils ,, 270° C. | 28 | 25 64 |
| Heavy oils ,, 350° C. | 8 | 7·51 |
| Pitch | | 59·88 |

## DISCUSSION.

Mr. H. D. Madden (Cardiff) said he felt sure he was voicing the views of all those present in expressing thanks to Mr. Franks for his paper—the more so because he had taken an original line, and done something which could only be done on a small works with the utmost difficulty. He (the speaker) was aware of some of the conditions the author had had to put up with, and knew that it was impossible for him to store an ounce of coke on the yard without having to dig a tunnel-way through. In the face of all this, he had carried out the carbonizing alteration referred to. How was the transition from horizontals to the chambers made under the stress of short ground space? As to the charges, was he right in dividing the 12 tons 19 cwt. into four charges, making something over 3 tons 4 cwt. per carbonizing chamber?

Mr. Franks: Yes.

Mr. Madden remarked that Mr. Franks had "hit the mean" between what he termed too large and too small charges. The question of the amount of water contained in tars was a pressing one; and there was nothing shown in the tar analysis for water. Again, was there anything to be included in the way of free carbon? Another point which struck him was that the author said there were three carbonizing units, and that on the Saturday morning he could let them all burn off together, so that they could be charged at one time in order to get the maximum make for the heavy lighting hours. It occurred to him that during the last few hours of the charge the gas would be tailing-off; and he would like to know whether any difficulty was experienced on the district from this. He took it that the greater proportion of the content was hydrogen and marsh gas, and that this might be liable to give trouble. The sample of coke handed round by the author was a beautiful one; but how did it answer for domestic use? It was very close-grained. He (the speaker) knew the Coed Ely coal and coke very well. But this specimen had more the appearance of a hard foundry coke; and the point certainly arose in his mind as to whether it would be quite suitable for domestic use. The coke made was put at 12·5 cwt. per ton, and he assumed that the breeze was not included in this.

Mr. Franks: The breeze is screened out first.

Mr. Madden (continuing) referred to the figure for carbonizing wages of 10·27d. per ton, and asked whether this included the fireman only, or also the wages of the boiler-man who assisted. It said in the table, "Labour on stoking per ton of coal carbonized;" but he took it that the hauling of the coke to the top was part and parcel of the work of carbonization. Looking at the composition of the gases (that was, under the ordinary working conditions for Welsh coals), it seemed to be very regular and good. He would like to say how much one appreciated work done in this direction. The carbonizing questions of to-day were the big ones; and work like that Mr. Franks had undertaken was exceedingly useful and interesting.

Mr. J. H. Canning (Newport) endorsed Mr. Madden's remarks with regard to the value of the paper. One or two other points had, however, occurred to him on which information would be useful. He would not ask Mr. Franks what was the cost of this type of setting; but could he give them some notion as to whether it exceeded or fell below that of (say) a horizontal setting with hand working of the same capacity? Of course, the relative costs of carbonizing must depend very largely upon this point. In the arrangement described, the charge of coal would be much heavier and deeper at the front of the setting than at the back. Was there any difficulty in the carbonization of this very heavy charge just at what they would be led to believe was the coolest part of the chamber? An angle of 45° was a fairly steep one; and it would be expected that there would in consequence be considerable pressure thrown by the coal on the door of the retort. Had such a pressure been noticed; and, if so, had it caused any difficulty in the raising of the door at the time of discharging? He would also like to know whether any difficulty had been experienced through the too-rapid discharge of the coke. At the close of the paper, the author referred to the possibility of small gas-works making coke for metallurgical purposes during the summer months, and recovering the bye-products. This was really the point. Had Mr. Franks disposed of any of his coke for metallurgical work? If so, how had it answered; and had he, in his opinion, been able to get such a price as would recoup him for the cost of making it?

Mr. J. E. Kenshole (Merthyr) said the author gave the width of the setting as 18 inches, but did not state the depth or length. The costs were given for the heavier months; but how were they going to turn out during the lighter months in the summer? He took it that it would be necessary to keep on the same number of

men; and this would send up the cost very considerably. With regard to the reduction of the number of stokers employed, would Mr. Franks tell them by how many he had reduced it? Also what was the cost of working the old system as compared with the new? They had no idea of what his costs previously were, and so it was impossible to estimate the saving.

Mr. FRANKS, in reply, said Mr. Madden had asked how he managed to do it. Originally, they had four double settings of seven retorts; and the chambers were put in in place of two of the beds. The contract was let for the ironwork—buckstays and doors—but at the time the chambers were required to produce gas, the doors and other ironwork, owing to a strike at the iron-founders', had not been delivered. They had no means except the chambers of making the extra quantity of gas required to meet the supply. Therefore the gas manager had to get a bricklayer; and at every period of carbonization they together filled up the front of the setting with bricks and lime-washed it, instead of having doors. He could assure them that this was quite a novel experience. The tar had been analyzed as free from water. It was about proportionate with the light oils. Free carbon he had not been troubled with at all. As a matter of fact, when he built these chambers, he thought it would be necessary to have a water-seal. He later did away with this, and used a tar-seal. However, one day the tar-pump broke down, and he did not have a seal. From that time, they had worked without any seal at all. They found that the hydraulic main after two or three months' working got pitched-up; and then they got rid of the pitch in the hydraulic main by heating, and ran the pitch off and sold it. To do this took a man from about 10 o'clock in the morning until 3 o'clock in the afternoon, which was cheaper than steam required for using a pump continuously. When they found the gas beginning to tail-off, they shut down the valve. They did not allow it to enter the gasholder. The illuminants in the gas were driven off in at about fifteen hours. In Ferndale, the collier got his coal at about 4s. per ton, and coke was sold at 13s. 4d.; so the demand was very small. As a matter of fact, it was hardly used in houses at all. The men would rather burn the steam coal. The bakehouses took their coke, and preferred it to the other. It lasted longer; but, of course, they had to break it smaller. The 12·5 cwt. of coke made per ton of coal did not include the breeze. It passed through a 1¼-inch screen. As to the boiler man, the work at Ferndale was rather different from that at most gas-works, because the holder capacity was limited, and they stored a lot of gas under pressure. What the stoker actually did for his 5s. was to charge the two chambers, draw out the coke, lift it into a barrow, wheel it from the subway to the lift, and raise it to the yard, and then tip it. The only thing the boilerman did in connection with the stoking was to touch the steam-valves. No actual labour was performed by him. He had disposed of some of the coke at a satisfactory figure to a firm who wanted to make a contract for taking it regularly; but they required a coke of uniform density. The coal he was carbonizing was, however, "through" coal; and therefore the coke produced was not sufficiently high in density. Though he could, as a matter of fact, make a contract at the present moment for this coke as middles furnace coke, he did not want to do so, because when he could secure a uniform coal, either nuts or small, he would get a coke of better density, and obtain a higher price for it as furnace coke. Of course, there was another effect of using "through" and "through" coal—there was a higher percentage of sulphur than the iron foundries care to take. On the point of expenditure, he might say that the cost of the setting to the Ferndale Gas Company was much higher—owing to the iron founders' strike, and to the somewhat experimental nature of the setting—than it would be again. Each of these chambers could be built for £60. No machinery was needed; and there was no alteration to the retort-house. He was including the price of the furnace. Originally, he built the furnaces level, and had difficulty in getting the coke out. Then he used the angle of repose of coal. But the coke would not "slide" out; and so he made the angle steeper. Even now, it did not rush out, or at any rate it did not push the door out. Another thing was that, with the "through" coal, the cobbles came to the front and the small stayed at the back. When the door was opened, the man got a bar and picked away the first foot at the bottom of the charge; and when he had done this, the weight brought the whole lot out. But it came out very slowly, owing to the friction on the sides of the chambers. The doors weighed about 18 cwt., and were lifted comfortably with 2-ton blocks. There was nothing to keep the door in except its own weight, so they could see that there was no pressure on the front of it. A question had been asked as to the length and depth of the chamber. It was 11 feet by 8 feet, and tapered from front to back. The chambers he was dealing with were nothing like so perfect as he could make them now; but the figures he had given were absolute working figures. He had presented a plain unvarnished tale of actual cost. He was using six chambers in the winter, and carried them through until April 24, varying the length of the period of carbonization. The next week, they put on three chambers, with two men. For the 5s. a man attended to two chambers; but if one was required, he would only be paid *pro ratâ* for it, and for the rest of the day might be in the yard or painting. They kept no regular yard man, so there were plenty of jobs to be done. The year before last, he had eight stokers in the winter; and last winter he had three. He did not know whether other members were as badly off as he was; but he had great difficulty in obtaining good stokers. Therefore he tried to do away with them as far as possible. Now, if he was told suddenly at night that a stoker had not turned up, he was able to say: "All right, let us shut-down and go to bed, at any rate it will be all right until to-morrow morning." [Applause.] He had been asked for a comparison between the cost of his old and new systems of carbonizing. For the thirty weeks' working to April, 1913, the stoking wages were £153 10s. 3d.; and for the same period twelve months earlier they were £352 12s. 5d. In other words, the labour on stoking per ton of coal carbonized was now 10·27d.; whereas previously it was 2s. 6·07d.

The PRESIDENT (Mr. T. E. Franklin, of Barry) said he might make a suggestion for overcoming a difficulty of the kind referred to by the author in the course of his remarks. When working some years ago on the old Dinsmore process, they were troubled by blocking-up of the foul main with a hard, pitchy substance. They made the ascension-pipe fairly large, and water-jacketed it—utilizing the water which was used for coke-quenching purposes. From the time they did this, there was never a case of a pitched-up main. Before this, it used to be a regular occurrence on a Saturday, when they wanted to get out, to have to set to work unpitching the main.

Mr. FRANKS remarked that he did not want it to be understood that he regarded the pitching as a nuisance. He preferred it to having to pay for steam. As he had said, the pitching-up process took between two and three months; and it seemed to him better to run the deposit off and sell it as pitch than to continuously circulate water or waste steam.

## Newbigging's "Handbook for Gas Engineers and Managers."

In accordance with the announcement in the last number of the "JOURNAL," the eighth edition of the above-named work was published last Friday at the offices of the "JOURNAL." It is dedicated to the President, Council, and members of the Institution of Gas Engineers, "in this the Jubilee year of the Institution." Pending the fuller notice of the book which will appear in an early issue, it may be mentioned that in a prefatory note the author points out that the continual progress which is taking place in the apparatus, machinery, and methods of the gas industry has necessitated a revision of portions of the text and the addition of much new matter; but he adds that no effort has been spared to "maintain the high standard of the work and its usefulness to engineers and managers, as well as to students seeking entry into the profession." The text is fully illustrated and the book has a portrait of William Murdoch as a frontispiece.

## Manufacture of Residual Products.

In the course of a lecture on the "Latest Achievements and Problems of the Chemical Industry," delivered by Dr. Carl Duisberg at the Eighth International Congress of Applied Chemistry, he referred to what has been achieved in the way of the more direct generation of energy from fuel; and he pointed out that the manufacture of bye-products goes hand in hand with this. These products, he said, include ammonium sulphate—of such great importance in agriculture—and the tar distillation products so indispensable in the colour industry. The latest and most rational method of utilizing the peat or turf beds so plentiful in Germany and in many other countries, is practised in Schweger Moor, near Osnabrück, according to a process discovered by Frank and Caro. There peat gas is produced and utilized, and ammonia obtained as a bye-product; the required power being generated in a 3000 H.P. central electric power station. The moorland, after removal of the peat, is rendered serviceable for agricultural purposes. At Schweger, from 2500 to 2600 cubic metres of gas, having from 1000 to 1300 calories of heat, were obtained from 1000 kilos. of absolutely water-free peat in the form of air-dried peat with 45 to 60 or 70 per cent. of moisture. This gas represents energy equal to 1000 H.P.-hours, equal to 700 kilowatt-hours, after deducting the heat and power used for the operation of the gas-works. In addition, 35 kilos. of ammonium sulphate were produced from the peat, which contains 1 per cent. of nitrogen.

**"Transactions" of the Institution of Water Engineers.**—We have received Vol. XVII. of the "Transactions" of the Institution, containing the reports of the summer and winter meetings held last year under the presidency of Mr. J. Spiers Pickering, M.Inst.C.E., of Cheltenham. The proceedings at the two meetings were noticed in the "JOURNAL" at the time; but the papers appear fully illustrated in the volume under notice. An account is given of the visit of the members to the Llwyn-on reservoir works of the Cardiff Corporation on the 21st of September; a description of the works, accompanied by two coloured maps, being given by Mr. C. H. Priestley, M.Inst.C.E., the Water Engineer to the Corporation. In addition to the technical matter, there are abstracts of legal cases connected with water supply, as well as summaries of the contents and indexes to the subject-matter in all the volumes. The library catalogue, list of the Council, Officers, and Past-Presidents, and statement of the year's accounts, make up the contents. As usual, a portrait of the President serves for a frontispiece. The volume has been produced under the editorship of Mr. Percy Griffith, M.Inst.C.E., F.G.S., the Secretary of the Institution.

# WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

## Half-Yearly Meeting at Barry.

FOUR years ago, the Institution had a pleasant meeting at Barry—a happy experience which was repeated last week, when the town was revisited by a gratifying muster of members, as the result of a cordial invitation extended to them by the President (Mr. T. E. Franklin). The gathering was fixed somewhat later in the month than on recent occasions for the first meeting of the year; and this had, as one of its advantages, the securing of a perfectly fine day for the visit. Barry, with its busy docks, and with its, in another way equally important, facilities for rest and recreation, was seen at its very best; and every one will be looking forward to a third visit at, it is to be hoped, a not too far distant date. The business meeting in the Urban District Council Offices was not a very long one. In addition to some general business, there was an address by the President, which was short but to the point, and a paper by Mr. E. A. Franks, of Ferndale, equally short and to the point. Then followed luncheon, during which a warm welcome was extended to the Institution, the members of which were pleased to note the high esteem in which their President is held by members of his Council. Thereafter there was a visit to the gas-works, in the course of which the visitors were able to see for themselves, in the alterations made to the works since they were last there, that Mr. Franklin is a man of energy and resource.

The meeting was held in the Gas and Water Offices at Barry Dock, which had been placed at the disposal of the Institution by the Urban District Council; and there were about forty members present when the PRESIDENT (Mr. T. E. Franklin) took the chair.

### MINUTES OF THE LAST MEETING.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) read the minutes of the last meeting; and they were confirmed by the members.

### NEW MEMBERS.

The following new members were next elected, on the proposition of Mr. R. A. BROWNING (Neath), seconded by Mr. J. H. CANNING (Newport): Mr. W. J. Dyer, Assistant Manager, Bridgend; Mr. G. T. Sprague, Assistant Manager, Ferndale; and Mr. A. F. Thomas, Assistant, Pontypridd.

### ANNUAL REPORT AND ACCOUNTS.

The HON. SECRETARY then read the eighth annual report of the Council. This stated that during the year nine members had joined the Institution, and two resigned, leaving the number 64 at the end of the twelve months. The receipts amounted to £34 2s. 6d., and the payments to £31 1s. 6d.—making, with the balance of £25 16s. 10d. brought forward from the previous year, a sum of £28 17s. 10d. in the hands of the Treasurer. A copy of the "Reports of the District Associations" for 1912 had been sent to all members who had paid their subscriptions.

The report was adopted on the proposition of Mr. J. E. KENSHOLE (Merthyr), seconded by Mr. G. MAYNE (Penrhiwceiber).

### ELECTION OF OFFICE-BEARERS.

The following were the officers recommended by the Council, and elected, for the ensuing year.

*President.*—Mr. H. D. Madden, of Cardiff.
*Vice-President.*—Mr. A. W. Branson, of Caerphilly.
*Hon. Treasurer.*—Mr. Henry Morley, of Teignmouth.
*Hon. Secretary.*—Mr. Octavius Thomas, of Pentre.
*New Members of Council.*—Mr. J. H. Dyer, of Bridgend, and Mr. L. J. Langford, of Abertillery.
*Hon. Auditors.*—Mr. J. A. Boucher, of Maesteg, and Mr. J. Robb, of Chepstow.

The PRESIDENT, in proposing the election of Mr. Madden as President, said that, if he could see his way to accept the position, they would be highly favoured, as no better man could possibly be found for it.

Mr. BROWNING seconded, and said they could not do better, as Mr. Madden had had great experience at Cardiff, and he had helped the Institution in every possible way.

Mr. MADDEN said Mr. Thomas had written him several times during the last few weeks, and he had told him in reply how exceedingly busy he was at present. He had also suggested that he was really only a newcomer in the South Wales district, and that one of the older members should be made President; but the Secretary had left him no loophole. So he could only say he would do his best to fill the office in a worthy manner.

### THE GAS INSTITUTION BENEVOLENT FUND.

The HON. SECRETARY proposed that the Institution should subscribe a sum of £2 2s. as usual to the Benevolent Fund of the Institution of Gas Engineers; but, at the same time, he made an appeal to the members to support the fund individually. The Institution were, he pointed out, open to receive subscriptions as low as 5s. There were a number of persons in need of help; and the money at disposal was none too much to keep the fund going. In fact, he believed they gave away last year more than they received.

Mr. MADDEN, in seconding, said that several of the leading subscribers to the fund had spoken to him on the matter in London. It was certainly a fund that was well worthy of their support. He had heard of cases in which the help given had been most beneficial.

The proposal was agreed to.

### NATIONAL GAS EXHIBITION.

The HON. SECRETARY then read a letter from Mr. W. T. Dunn, writing as Hon. Secretary of the National Gas Exhibition. This stated that the Organizing Committee were now drawing-up a programme of daily events in connection with the exhibition, and they suggested that on Wednesday, Oct. 15, the Wales and Monmouthshire Institution should pay an official visit to the exhibition. Mr. Dunn said he would be glad to know as soon as possible whether this date would suit the convenience of the President and members. Steps would then be taken to make it known throughout the district that this day would be a "Welsh Day" in connection with the exhibition, and efforts would be made to arrange for special excursion trains to be run to London on that date from the principal towns in Wales. It was, of course, understood that the programme of the day's visit would be left entirely as a matter for provision by the Wales Institution. The Committee would endeavour to arrange for a conference room to be at the disposal of the Institution during the whole or part of that day. In view of the large number of special days for which the Committee had to make arrangements, it was hoped that the Institution would be able to agree to the suggested date.

Mr. CANNING said it would be rather a difficult matter for an Institution like theirs to fix on one particular day; and it would be an unfortunate thing if they were to arrange for the day, and then the attendance should not be properly representative. It was, of course, a long way to look ahead. He quite agreed that, if at all possible, they should endeavour to fall in with the views of the promoters of the exhibition, and one proposition he would like to make was that, before proceeding further with the matter, the Secretary should be asked to ascertain individually from the members their opinions as to their being able to get away and go to London on the date named.

The PRESIDENT remarked that this was a very good suggestion. He had felt all along the difficulty would be, even if they arranged a day, for many of them to get off.

The course suggested was agreed to.

### APOLOGIES FOR ABSENCE.

The HON. SECRETARY read several letters and telegrams of apology for absence. Among those sending them were Sir Corbet Woodall, Mr. Thomas Canning, and Mr. A. H. Brookman. It was also stated that Mr. F. G. Andrews was very ill, and quite unable to be present.

### AMENDMENTS OF RULES.

Proposed by Mr. A. W. BRANSON (Caerphilly), seconded by Mr. KENSHOLE, various amendments of the rules were agreed to, so as to permit of the admission of students and the inclusion of honorary members—the students "to be pupils under the training of engineers of gas-works in the service of gas companies or local authorities." Also so as to allow the meetings of the Institution to be held any time in May and September.

### AN HONORARY MEMBER.

Mr. CANNING next proposed that Mr. Edward Jones, of Burslem, be elected an honorary member of the Institution. He said that, as they were aware, it was Mr. Jones who first suggested the idea of forming a local Institution. He came into the district some years ago from another part of the country, and one of the things that he missed most was a District Association. He thought—and thought rightly, as they had since discovered—that this was a want which should be filled at once; and he took steps to do it. With the assistance of Mr. Octavius Thomas the Institution was started; and therefore it was peculiarly fitting that they should make Mr. Jones their first honorary member. It gave him great pleasure to propose it—his father, if he had been present, had intended doing so. He trusted Mr. Jones might be long spared to continue an honorary member of the Institution.

Mr. BROWNING, who seconded, said Mr. Jones had always taken a great interest in their proceedings.

Mr. E. H. SWAIN (Pontypridd) remarked that, as Mr. Jones's successor at Pontypridd, he would like to associate himself with the proposal.

The resolution was cordially agreed to.

The PRESIDENT then delivered the following address, which he had been too busy to prepare in time for the previous meeting.

## PRESIDENTIAL ADDRESS.

Gentlemen,—It is with the greatest pleasure that I welcome you to Barry to-day; and I hope that you will find your visit both interesting and enjoyable. In taking the chair upon this occasion, I must also avail myself of the opportunity of expressing my thanks for the honour you conferred upon me when you elected me President of the Institution. It is an honour I have highly appreciated; but I regret I have not been able to carry out my duties in a more efficient manner. Not the least important of these duties is the preparation and delivery of an inaugural address worthy of consideration; and for the unpolished condition of the following I offer my sincere apologies.

As you are aware, our Senior Vice-President, Mr. S. T. Andrews, of Swansea, should have occupied the chair this year, but was unable to do so owing to ill-health; the honour thus became mine unexpectedly at a somewhat inconvenient period. This year has been an arduous one for me, and, of course, with the usual perversity of human events, my work, instead of decreasing during the last few months as I had expected, has been greatly increased by important and lengthy negotiations in connection with the Water Department under my charge, which have occupied what should have been my leisure time that I had hoped to devote to an address.

Like the majority of Presidents, I find that my predecessors in the chair and the occupants of those of our kindred associations having in their various inaugural addresses dealt ably and fully with all matters of general interest to us, it is an apparent impossibility to discover ground that has not been already well covered. In connection with this point, I would venture to bring forward a suggestion. Why may not the President, instead of delivering the usual address, present a paper, if he so chooses, which would be open to discussion? Experience has shown that the discussion often provides information of equal importance to that contained in the paper read, and it certainly tends to increase our interest.

Before proceeding to deal with gas affairs, I would like to congratulate our Institution on its continued prosperity, and trust that it may maintain its progress in the future as in the past. I also hope that the proposed addition to our rules, which enables students to be admitted, will be taken advantage of by the pupils of my fellow engineers; for I am certain that all who join will be accorded a hearty welcome and receive every encouragement and assistance.

### COMMERCIAL SECTION.

Our Commercial Section is, I am pleased to state, still carrying on its work, and, though young, is proving to be of the greatest value. I am looking forward to the time when every member of the Institution will be also a member of the Commercial Section, and so will partake of the undoubted benefits derived from the information circulated so freely at our meetings, and which, not being published, is otherwise unobtainable.

### BRITISH COMMERCIAL GAS ASSOCIATION.

We are all well aware of the splendid work which is being accomplished by this Association under the able presidency of Sir Corbet Woodall; and without doubt the extensive methods of advertising, which bring the many advantages of gas so prominently before public notice, will act more beneficially in the interests of the gas industry than any less concerted efforts could hope to do. Speaking from personal experience, I can assure you that many people will respond to an advertisement inserted in a widely circulated newspaper who would not dream of seeking to obtain similar information at the local gas-works, and who are indeed very surprised when their attention is directed to that quarter, and still more so when they discover how quickly and satisfactorily their orders can be executed. The good effects being so widespread may not be immediately apparent to every individual undertaking; but they are none the less sure, and will prove to be of a durable character. The scope of the Association's work must of necessity vary in accordance with the amount of financial support received, and I trust that ample assistance may always be forthcoming. In the case of urban district councils who are owners of gas-works, I regret to say that a technical difficulty arises in connection with this subject, as district councillors cannot authorize any subscriptions to be given without running the risk of being surcharged at the annual audit —such payments being illegal. I sincerely trust that this restriction may be removed in the near future; for, as partakers of the benefits, it is only fair that they should bear their just proportion of the expense.

### POSITION OF GAS INDUSTRY.

On taking a general view of our industry, I think that we may congratulate ourselves on the great progress it has made, and the position it holds to-day. Notwithstanding the rivalry of electricity, with its undoubted conveniences, the gas industry still continues to thrive, and never were the prospects brighter than at present. Some years ago we heard on all sides the prophecy that electrity was to sweep us from the field; but this, instead of causing depression, appears to have had an entirely opposite effect—to have strengthened us and caused us to give the keenest attention to all the problems in any way affecting our industry. Thus, despite the higher cost of coal, the higher rate of wages, and the general increase in the prices of commodities all round, the price of gas is almost universally being lowered, owing to the great improvements in the methods of production and distribution which are constantly introduced.

### VERTICALS *v.* HORIZONTALS WITH MACHINERY.

At the present moment, when the price of coal stands at so high a figure, the question of carbonization is of great importance to all gas engineers and managers, as the old saying that "dividends are made, or lost, in the retort-house" may still be taken as a truism. To those of us whose producing plant is becoming, or has become, inadequate for our requirements, the problem as to what system of carbonization to adopt in order to gain the best results is indeed interesting, though difficult to solve, as the engineering skill of modern days has rendered possible methods which, even a very few years ago, were quite impracticable. The horizontal system may, in all probability, be considered as having reached its high-water mark of efficiency; while the vertical system is still in its infancy. Much improvement, therefore, may be expected within the next few years. The engineer whose retort capacity is such as to enable him to await these developments is a fortunate man; but some of us must, for good or evil, shortly make our choice, and thus act as an example, or a warning, to others.

Some eighteen months ago, I was instructed by my Committee to visit several gas-works in different parts of the country in order to inquire into the merits of both verticals and horizontals with machinery. The tour proved most instructive; and after inspecting the working of the different plants, and receiving the information regarding them, which was most courteously and readily given to me, my personal opinion is that, while the results obtained from the horizontals which I saw were equal to those of the verticals, and they worked satisfactorily in all respects, the verticals have come to stay, notwithstanding their high initial outlay, and will prove a most particular boon to any works where space is limited. The labour conditions under this system are certainly excellent; the smoke, dust, steam, and noise usually associated with retort-house practice being remarkable by their absence.

The cost of a horizontal installation, even with the most up-to-date machinery, is very considerably lower than that of verticals, and in this respect makes a special appeal to a municipal officer to whom capital charges are a matter of grave consideration. Also, after long experience with horizontals, we know their average length of life and cost of maintenance. But in the case of verticals, time alone will enable us to receive reliable data. I must say, however, that, though I could not obtain actual figures in connection with the maintenance costs, I saw at St. Helens an installation of Glover-West verticals which had just been let-down for inspection and repair after almost three years' continuous working; and I was very astonished to see the condition of the retorts after such a period. The repairs required were very small, and I was also informed that the wear and tear on the machinery operating the plant had also proved to be inconsiderable. Both systems are being adopted in gas-works of comparatively small capacity; and as each has many advantages peculiar to itself, the final decision as to the type selected must, of necessity, depend on existing conditions at the works where extensions are required.

### CARBURETTED WATER-GAS PLANT.

The advantages to be derived, both directly and indirectly, from the installation of carburetted water-gas plants are so great that it is not surprising to learn that they have been generally adopted all over the country, even by concerns of quite moderate size. The value of these plants was very forcibly impressed upon us at the time of the coal strike last year; and the engineers of those undertakings which were so fortunate as to possess one were greatly to be congratulated. At Barry, we were not so situated; and our plant, being erected during the autumn of last year, was only put into operation just before the Christmas rush, when its great convenience quickly became evident. Unfortunately, the price of oil, after remaining for a considerable period in the neighbourhood of 2½d. per gallon, was suddenly inflated to about double this figure. As we are informed that this enhanced price is due to heavy freights consequent upon the big boom in trade, we cannot hope for very much abatement just at present. Nevertheless, this modern auxiliary has been of such help to us that the advantages have outweighed this drawback. Prompt availability in the case of sudden loads, low capital cost, economy in storage accommodation, occupation of little space, and the reduction to a certain extent of our dependence on the coal supply are merits which it can justly claim.

### CONDENSATION, ETC.

The methods of condensing, washing, scrubbing, and purifying the gas, which for so long remained in an almost stationary condition, have of late years shown signs of greater activity, and improvements are being introduced. The water-tube condensers

are now greatly used, as they allow us to reduce the temperature of the gas to the desired extent with an accuracy which was impossible when cooling with the old atmospheric type. They also occupy much less ground space; and by adopting those on the reversible principle, we are enabled without difficulty to rid ourselves of any naphthalene which may be deposited there. The importance of eliminating all tarry matter from the gas before the commencement of washing and scrubbing being now generally recognized, there are in the market various forms of apparatus devised for this purpose.

While the well-known Livesey and rotary washers are always in demand, a plant which is coming into favour in some quarters is the vertical type of washer-scrubber, provided with centrifugal or other mechanical devices, and in others the tower-scrubber still receives a welcome. In some of the smaller works, however, a direct-recovery ammonia process has been adopted—acid washers having been substituted for the usual washing and scrubbing plants. Their progress will be most interesting to note. There are also signs that in the near future the Burkheiser and Feld processes may bring about a revolution in our methods of gas purification and sulphate production. In connection with the purifiers there have now been introduced luteless lids, various types of new valve arrangements, and patent grids, which innovations have greatly increased their capacity and safety in working, diminished the back-pressure, and allowed full advantage to be taken of the prolonged activity of the purifying agent, which is secured by occasionally changing the order of rotation in which the boxes work.

### TAR DEHYDRATION.

Fortunately for the gas industry, the use of tar in the treatment of materials for road-making and road-spraying purposes has greatly increased the demand, and so enables us to obtain better prices for this commodity. The crude tar, as at first experimented with, was not found altogether satisfactory, owing principally to the excessive amount of water contained therein; this excess being largely due to the modern method of carbonizing with extremely high heats. This fault is not difficult to remedy, as, by the aid of a tar-dehydrating plant, practically the whole of the moisture can be removed, together with a proportion of the light oils, with perfect safety and not a great amount of trouble. The plant not being difficult to operate, an intelligent workman, if he be willing, may in a few days be trained to undertake the working of it. The higher price obtained for this prepared tar fully justifies the outlay and the extra work involved. I may incidentally point out that the light oils can be used for enrichment purposes; while the tar is found most useful about the works, as in many instances it may be employed as a cheap substitute for paint.

### GAS-FITTING REGULATIONS.

It is now extensively acknowledged that gas authorities should, in the interests of both the consumers and themselves, be allowed to make regulations governing the size and material of all pipes, together with fittings used in connection with same, laid on the consumers' premises. In the Barry Urban District Bill of 1913, we were seeking to acquire these powers. We were, however, astonished to learn that, in the gas portion of the House of Lords Model Bills and Clauses (as amended, 1912), Clause 28 reads as follows:—

> In order to enable the company to ensure a satisfactory supply of gas to their consumers, the following provisions shall have effect:
>
> 1.—The company may specify the size and materials of the pipes, with the fittings thereof, which are to be laid by the consumer on his own premises, either in the first instance or on the occasion of any renewal, between the company's mains and the meter, so far as such pipes and fittings are intended to be covered over.
>
> 2.—The company may, if they think fit, make different specifications for different classes of premises, having regard to the probable maximum consumption of gas thereon at any one time.
>
> 3.—The specification shall be published twice in some newspaper (once in each of two newspapers) circulating within the limits of supply; and a copy thereof shall be kept exhibited in the office of the company.
>
> 4.—Every meter to be used in a new building, or a building not previously supplied with gas, or in connection with a new or substituted pipe laid by the consumer between the main and the consumer's meter, shall be placed as near as reasonably practicable to the company's main, but within the outside wall of the building.
>
> 5.—When any such pipe or meter as aforesaid has been laid or placed, notice thereof shall be given to the company, and the pipe shall not be covered over until after the expiration of twenty-four hours from the service of such notice on the company. Any officer of the company duly appointed may, between nine o'clock in the morning and five o'clock in the afternoon, attend and inspect such pipes (with their fittings) and meter; and if the officer is not permitted to make the inspection, or if the pipes or fittings are not according to the company's specification, or if the meter is not placed as required by this section, the company may refuse to supply gas to the premises until the provisions of this section have been complied with.
>
> 6.—Any person to whom the company refuses a supply of gas under the provisions of this section may appeal to a petty sessional court against such refusal, and the court may, after hearing the parties and considering any questions as to the reasonableness of the company's specification, make such order as seems to them proper in the circumstances, and may order by which of the parties the costs of and incident to the appeal shall be paid.

From this, it will be seen that sections 4 and 5 distinctly imply that the consumer may lay his own service pipe between the main and his meter. This is considered by my own authority (and not by them alone) to be so great a drawback that it has been decided to withdraw that portion of the Bill.

### THE BARRY GAS-WORKS.

Before drawing to a close, I thought that, as we shall shortly proceed to inspect the gas-works, a few brief remarks on the alterations which have been carried out since your last visit might be of some little value.

*Producing Plant.*—As I have before mentioned, we have now in operation a carburetted water-gas plant, having a capacity of 500,000 cubic feet per day. This plant has worked most satisfactorily and without a hitch from the first. Our reason for its adoption here was the fact that it enabled us to work out our inclined retorts, which would have been compulsorily scrapped had we at that time installed and worked advantageously either verticals or horizontals with machinery. This course at that juncture I did not consider either advisable or businesslike.

*Steam Generating Plant.*—The two egg-ended boilers, which, together with the condensers, exhausters, washers, scrubbers, and station meter, constituted the original plant, were installed when the works were first constructed; but they have since been replaced by two new Lancashire boilers, each 28 feet in length and 7 ft. 6 in. in diameter, fitted with patent breeze furnaces and the latest valves and fittings, and mounted on Poulton's patent settings. These boilers, being much larger than the older ones, necessitated the lengthening of the boiler-house by 18 feet.

*Exhauster-House.*—In this house have been installed two new exhausting plants—one of 60,000 cubic feet and the other of 80,000 cubic feet per hour capacity—a boiler feed pump, and an air compressor. The latter has been a source of great convenience and economy, as by its aid petroleum is sprayed into the naphthalene plant, and the oil for the carburetted water-gas plant is directly elevated to the storage tank from the waggons in which it is received. It also forces the sulphuric acid from the underground storage tank to the sulphate-house, situated some 75 yards distant.

*Condensers, Washers, &c.*—The new water-tube condensers consist of two columns, each 6 feet square inside measurement and 21 feet deep overall, with a bottom water-chamber 2 feet deep and a top one 1 ft. 6 in. in depth. At present the water used in the condensation process is passed into a tank, where it is further heated by means of an exhaust steam coil and then used for boiler-feed purposes in order to prevent unnecessary waste. We also make use in the same manner of the condensing water from the carburetted water-gas plant. The erection of a Pelouze and Audouin tar and naphthalene extractor, a Livesey washer, and a rotary washer-scrubber has just been completed, and this plant will be shortly put into action. As the washing and scrubbing apparatus has been much too small for many years past, I now anticipate a better yield of ammonia, which so far has not been high.

*Tar Dehydrating Plant.*—On a site adjoining the boiler-house a tar dehydrating plant, capable of dealing with 4000 gallons of tar per day, has been erected; and its working is giving the utmost satisfaction. The prepared tar is now being exclusively used for road tarring purposes in Barry.

*Sulphate Plant.*—The capacity of this plant, which has been working since last December, is 2 tons per diem, and we have already disposed of 50 tons of sulphate—some 20 tons being now in stock and ready for sale. Having at my disposal a building consisting of two compartments, which were originally fitting and meter-repairing shops, but which had fallen into disuse owing to lack of space and their awkward situation, I converted it into a suitable sulphate-house by removing part of the division wall.

*Station Meter.*—After incorrectly registering the make of gas for several years, the station meter at last completely broke down, and has been replaced by one of 80,000 cubic feet per hour capacity. The old meter, after thorough repair and re-erection, will be used in connection with the carburetted water gas.

Mr. SWAIN, in proposing a hearty vote of thanks to the President for his address, said Mr. Franklin's apology was quite unneeded. They were very pleased to have him as their President, and pleased with the way that he was carrying out the office. A review of the gas industry was always useful, and, coming from a man of the ability of Mr. Franklin, was specially so. He agreed with the remarks about the British Commercial Gas Association. Seeing that from time to time they received the results of inquiries put through that organization, it was much to be regretted that they were unable to get their councils to subscribe. But, of course, as was pointed out, it was held to be quite illegal. They would carry away many helpful thoughts from the address they had just listened to.

Mr. LANGFORD, who seconded, said he also had been particularly glad to see brought forward the point about the British Commercial Gas Association. Like Mr. Swain, he very often received particulars through the Association, and would very much like to see the difficulty overcome as to urban district councils subscribing. It had been interesting to hear about the extensions; and he was looking forward to visiting the works.

The vote was carried with applause, and briefly acknowledged by the PRESIDENT.

NOTES ON CARBONIZATION.

Mr. ERNEST A. FRANKS, of Ferndale, then read "Some Notes on Carbonization," which, with a report of the discussion, will be found on pp. 667-9. The author exhibited a sample of the coke produced by the setting described.

Mr. MADDEN proposed a vote of thanks to Mr. Franks—a vote which, he said, was specially deserved because the work was original.

Mr. CANNING seconded, and congratulated the author on the manner in which he had overcome his difficulties.

The vote was cordially passed, and Mr. FRANKS duly acknowledged it.

PLACE OF NEXT MEETING.

The HON. SECRETARY stated that the Chairman of the Chepstow Gas Company had very kindly sent the Institution an invitation, and the Council recommended that the next meeting be held at Chepstow.

This was agreed to.

THE BARRY COUNCIL THANKED.

A vote of thanks was, on the proposition of Mr. LANGFORD, seconded by Mr. J. MOGFORD (Briton Ferry), passed to the Chairman and members of the Barry Urban District Council, for lending them their offices for the meeting.

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LUNCHEON.

An adjournment was then made to the Masonic Hall, where the members were the guests at luncheon of the Chairman of the Barry Council (Mr. Thomas Davies, J.P.), the Chairman of the Gas and Water Committee (Mr. George Wareham), and Mr. Franklin, who presided.

The speeches followed the examples already set by the address and the paper—being brief and to the point. After the Loyal Toast had been honoured,

Mr. H. D. HAZELL (Newport) proposed "Prosperity and Success to the Barry Urban District Council," coupling with this the names of Mr. Davies and Mr. Wareham. He said they were very grateful to their hosts for the hospitality extended to them. As to Mr. Franklin, they all appreciated the fact that his abilities entitled him to the honour of being President of the Institution, and an excellent President he had made. If all that he had told them about the works turned out to be true when they inspected them that afternoon, they would admit that there was a very enlightened set of men responsible for the gas supply of Barry. Those present knew that the gas industry was not played out. They might point to some of the most go-ahead concerns in South Wales to-day which, in spite of the competition of another illuminant, had come to the decision to use the older lighting medium, for the more efficient and reliable illumination of their concerns. There was the case of the Great Western Railway, who, in connection with some of their great undertakings in the district, had awarded the palm to gas, as the result of their experience. Gas had still a great future. He was connected with a concern which in a few days' time would celebrate the seventieth anniversary of its incorporation; and it was as young as ever, but much stronger than in the first year of its existence. When the Barry Council sent the Institution another invitation, it would be accepted most heartily.

Mr. DAVIES, in acknowledgment, assured the members that they were most welcome, and told them that the Council were doing well with their gas undertaking. Formerly a parasite, it was to-day a beehive of profitable productiveness. He had been told that they had one of the best gas managers in South Wales.

Mr. WAREHAM, who also replied, said Mr. Franklin came to them when they had passed through troublous times. They might, perhaps, have been about to turn the corner; but he had made a concern that was losing money into a highly profitable one. Many thousands of pounds had been paid over to the rates. He felt, and he was sure every member of the Gas and Water Committee felt, that they had a good Manager; and they had done everything in their power to assist him. Those of them who visited the works four years ago would be agreeably surprised if they went round them that afternoon. Before sitting down, he would like to propose the toast of the "Wales and Monmouthshire District Institution of Gas Engineers and Managers." He understood that nearly the whole of the gas undertakings in the district covered by the Institution were represented among the members; and every authority should render to the organization every help possible. He hoped that they would soon come to Barry again, when everything would be done to make them welcome.

The PRESIDENT, in response, said they were grateful, both as an Institution and individually, for the way in which the Council had received them. It was a great advantage to local authorities that their engineers should have an opportunity of going round different works, and learning from other people's methods things they possibly would not otherwise have known. He himself was indebted to the whole of the members of the Barry Council, and the members of the Gas and Water Committee past and present, for the great help and encouragement they had given him. He had been ably supported in every way; and it would be admitted that they had done fairly well with their gas undertaking—seeing that within the last four years they had not only been able to subsidize the rates, but had reduced the price of gas 9d. per 1000 cubic feet.

## AT THE GAS-WORKS.

Luncheon over, the party were conveyed by motor omnibus to the gas-works, where they were afforded an opportunity of seeing the changes that have been made by Mr. Franklin since the previous visit of the Association to Barry in May, 1909. It was seen that, as had been pointed out by the President in the course of his address, the improvements and additions, carried out and now in hand, are of a substantial character; and as a good deal of the work was at the moment being done, the inspection was one of peculiar interest. What was seen during the tour indicated in many ways the resourcefulness of the President, as well as his determination to make adequate provision for meeting the demands for gas. That extensions have been called for is not surprising, when one considers that five years ago, when Mr. Franklin went to Barry, the annual make was 158 million cubic feet, while last year it was 185 millions. In point of fact, the consumption increased in the past year by 15 million cubic feet—Barry having to some extent felt the refreshing trade boom breeze, which was all the more welcome because of the way in which the neighbourhood had suffered through the notorious Cambrian Combine strike. Another incentive to larger consumption has been the reduced price of gas. A sum of 4d. per 1000 cubic feet was taken off in January, 1912—making a total reduction of 9d. within four years.

Inquiry elicited the information that all South Wales coal is used in the works, for the obvious reason that the additional cost of carriage which would be involved in obtaining the best classes of gas coals would more than counterbalance the advantages in other ways possessed by them. The works are close to the Barry Railway, on a siding from which the coal is brought in. Of the two retort-houses, one is filled with eight beds of six inclined retorts, and all the necessary equipment, and has a capacity of about 600,000 cubic feet per day. From the other, five beds of horizontal retorts have been taken out; and with the brickwork thus freed, a wall was put up to divide the house into two parts—one part to be used as a smithy and to accommodate a carburetted water-gas plant, and the other as a coal-store.

To return to the inclined retort-house, it was noticed that the coal on arrival is shovelled from the waggons to the boot of the crusher, where, after being broken, it falls into elevator buckets, and is raised to the top of the house for storage in steel bins. The coke drops from the retorts into a trough, with jets of water playing on it, and is then conveyed to the outside of the house and taken up by another conveyor, by means of which it is possible to deposit it in the yard or send it forward and drop it into overhead storage hoppers.

The 500,000 cubic feet per day carburetted water-gas plant is conveniently arranged. It is by Messrs. Humphreys and Glasgow, with all the latest additions and improvements. In the adjoining turbine-room, there are two De Laval turbines, each of 15 B.H.P., running at a speed of 2400 revolutions per minute. There is a hydraulic ram which works the coke-lift, and over the turbine-room (thus saving a lot of space) a coke-floor has been arranged, conveniently for the charging of the water-gas plant. A Thorp and Marsh recorder shows the duration of each blow and run over the 24 hours; and a "Bristol" electrical pyrometer gives the temperatures at the top and bottom of the superheater. The oil used for the turbines is filtered, and employed over and over again; and the water for working the hydraulic lift is also pumped round and round. Further saving is effected, as pointed out by the President in his address, by passing the water from the water-gas and coal-gas condensers to an overhead storage tank, further heating it with exhaust steam, and feeding the boilers with it. In the other portion of the old retort-house, it is intended to fit up a business-like set of machine tools, with a fan-blast for smithy work.

Interest was taken in the new water-tube reversible condensers, Livesey washer, rotary washer, and Pelouze and Audouin tar-extractor, which are being put in by Messrs. W. C. Holmes and Co., as well as in the two new exhausters by the Bryan Donkin Company. The coal gas and water gas have up to the present time been mixed at the inlet to the condensers; but Mr. Franklin is thinking of mixing them at the inlet of the Pelouze and Audouin plant, to afford readier control of the coal-gas making operations. The water gas is now stored separately in a holder of 200,000 cubic feet capacity, from which it is drawn as required. The holder into which the mixed gas is eventually passed is a 650,000 cubic feet spiral-guided one, by Messrs. C. & W. Walker. An oil-storage tank of 50,000 gallons capacity is provided, into which the oil is forced by compressed air from the tank-waggons. This compressed air apparatus is also used for elevating acid from the storage tank to the sulphate plant, and for compressing oil for the prevention of naphthalene.

In connection with the new boilers, there are valve arrangements whereby it is possible to utilize one portion of the plant without putting the other part out of action. Over the added part at the back of the boiler-house, a box girder has been placed, and economy in space is secured by storing above this heavy lead goods, &c. For purifying, all oxide is used. There are three boxes 30 feet by 20 feet, operated by a Weck valve, and four boxes 13 feet square; the latter being used as catch-boxes.

For the prevention of naphthalene, oil is put into an old boiler, compressed to 40 or 50 lbs. pressure, passed through a steam-jacketed pipe into a cylinder having a steam-coil in the centre, and then sprayed into the gas. Ordinary petroleum is used; and Mr. Franklin has hardly known a naphthalene complaint since the system was put to work. The man merely has to fill up the oil-receiver once a day, as it holds sufficient to give a spray for this period. Retort-house and water-loaded station governors, by Messrs. Parkinson and Cowan, are used; and referring to the latter, Mr. Franklin pointed out that the district is a very difficult

one to supply, there being a big dip in the centre. He has just at the moment a scheme on foot for dividing the area into two sections, so as to enable him to supply the higher parts at a lower pressure, and at the same time give the low-lying portions a satisfactory supply.

A point in connection with the new 80,000 cubic feet per hour Braddock station-meter is that it is fitted with Westwood and Wright valves, which, owing to their convenient shape, can be used in a very small space such as is available in the house where the meter is installed. The members were able to inspect a quantity of excellent sulphate in store. It is made in a Holmes plant; and the President drew attention to a feature of the still that it is possible to get at every overflow in case of need, with a minimum amount of trouble. In fact, by merely undoing six nuts, four overflows are bared, without the necessity of taking the still to pieces. Some time was spent inspecting the Wilton tar dehydrating plant referred to in the address; and from the site of this, it was possible to admire the steel window frames in the carburetted water-gas house. These are by Messrs. Williams and Sons, of Cardiff, and are built up without any jointing. The repairing and testing of gas and water meters are carried out in adjoining shops. When cleaning stoves formerly, they were taken to pieces; but now they are simply lifted up and dropped bodily into a tank containing a suitable solution. Excellent stores have been provided, with back-to-back bins for every article likely to be needed; and there are also facilities for testing the capabilities of high-power gas-lamps. A new show-room is being prepared in the gas offices, fitted with a large number of live points, so that different lights may be shown in operation; and there is also a convenient laboratory and photometer-room.

From these few remarks, and the statements made by the President himself in the course of his address, it will be gathered that in Mr. Franklin the Barry Urban District Council possess an Engineer who not only sees what requires to be done, but who knows how to do it.

## Masonic.—Northern Star Lodge, No. 3053.

The installation of Bro. S. Meunier (Stockport) as W.M. of this Lodge was the outstanding feature of last Friday's meeting at the Midland Hotel, Manchester. The ceremony was impressively rendered by the retiring Master, W. Bro. Fred. J. West, who signalized the completion of his year of office by presenting the Lodge with a handsomely decorated banner, on which were inscribed the names of the nine Past Masters of the Lodge, with room for a large number of names, to be filled in year by year. For this presentation, a hearty vote of thanks was accorded to the retiring W.M. before the close of the proceedings. The Treasurer, W. Bro. W. Whatmough, of Heywood, who had been re-elected, was duly invested; and the other officers invested by the new W.M. were:

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|---|---|
| Bro. T. W. Jordan (Stockport) . . . . . | S.W. |
| ,, James M'Ewan (Manchester) . . . . | J.W. |
| ,, F. E. Moss (Wigan) . . . . . | Chaplain. |
| W. ,, R. G. Shadbolt (Grantham) . . . . | Secretary. |
| ,, E. J. Wellens (Hebden Bridge) . . . | S.D. |
| ,, J. Bond (Southport) . . . . . | J.D. |
| W. ,, W. Prince (Stoke-on-Trent) . . . . | D.C. |
| ,, F. H. Lamb (Sale) . . . . . | Organist. |
| ,, E. O. Watson (Rawmarsh) . . . . | Assist. Secretary. |
| ,, W. B. Hudson (Prestwich) . . . . | I.G. |
| Bros. J. Fisher (Lytham), J. W. Morrison (Sheffield), J. Taylor (Bolton), T. Ousey (Salford) . . . . . | Stewards. |

The Charity Representative, W. Bro. J. W. Scott, was reappointed; and, in the course of the subsequent proceedings, he stated that there was a very urgent case in regard to the family of one of the late members of the Lodge. As a consequence, he would be very glad to receive [he is with Messrs. R. & J. Dempster, of Manchester] any votes available for the next elections for the Boys' and Girls' Homes, as also for the Benevolent Institution, so that, by exchange, all may be available to secure the prompt election of the Lodge nominee.

**Paint as a Preventive of Rust.**—According to a paragraph in the "Ironmonger," the question of the value of more than one coat of paint used to protect the surface of iron has not attracted so much attention from scientists as might be expected, and it has not yet been proved whether the cause of rust in painted iron is different from that which occurs with bare metal. The electric processes involved in painting iron have only been recently investigated. It has now been proved that, between the iron and the metal contained in the paint, electrolytic action takes place which must be considered as affecting the rusting. When painting iron, a first consideration has been to ensure that no pores are left; and therefore it has been customary to apply two or more coats of paint. The experiments carried out by Liebreich and Spitzer and recently published appear, however, to prove that it is, after all, better not to apply several coats of paint. The paints with which the tests were made consisted of pure linseed oil with white lead, zinc white, red lead, or iron oxide, or a mixture of white lead and lampblack, or zinc white and lampblack. Where several coats of paint were put on, the rust was found to have made more progress in a given time and under like conditions than where a single coat had been applied.

## YORKSHIRE JUNIOR GAS ASSOCIATION.

A very large company of the members of the Association assembled in Halifax on Saturday afternoon, to visit the works of Messrs. Drakes Limited.

Founded over fifty years ago, by the late Mr. Jonas Drake, father of the present head of the firm, the business has steadily increased in size, till it now has a technical and clerical staff of 56, and employs between 600 and 700 men—a number frequently augmented when carrying out large contracts. For some years, the firm had a foundry at Wortley, Leeds, which could not be extended sufficiently to meet their growing output; so to facilitate also prompt intercommunication and economical working, it was decided to concentrate all work at Halifax. A new large foundry has consequently been constructed, and the works greatly enlarged and re-arranged. They now cover an area of 40,270 square yards, of which the buildings occupy 2173 square yards. The present visit had been postponed till these enlargements and re-arrangements had been completed.

Assembling in the large drawing-offices, the visitors spent some time over the fine series of photographs and models arranged for their inspection. Much amusement was occasioned by an almost incredible selection of drill-heads, chain-links, couplings, &c., delivered with the coal at a Tyneside works, and collected from the breaker-pit. All had passed through the breaker without damaging it. A photograph of a still more extensive set collected some years ago at the same works was on view. A piece of chain of three links, each 3 inches long, had gone through one of the firm's charging machines without any further harm being done than the stop-piece hurled out of the retort. A collection of similar "unconsidered trifles" that had been delivered with the coal to the charging-machine at the Walker and Wallsend Gas-Works should have been on view, but was delayed in transit.

A hearty welcome was extended by Mr. W. A. Drake, Managing-Director, who, at the same time, explained that his father, Mr. J. Armitage Drake, J.P. (the Chairman), was unfortunately temporarily indisposed, and unable to leave his house. Mr. Wilfred A. Drake, Mr. J. W. Wallis (the Manager), Mr. Woodhead, Mr. Dick, and other chief officials were also in attendance. The visitors were then divided into parties, and conducted round the works. Most of the machines were shown in action—a sufficient number of workmen and most of the foremen being on duty. Finished specimens of all the smaller things made, and those stocked, were arranged for inspection; and though at this season of the year the yards were not as full as they often are, their contents proved of noteworthy interest. A pleasing feature of the visit was the fact that some of the members had come intending to see certain of the firm's productions in which they had special interest, or which they only knew by hearsay or from the catalogue. Accordingly, every now and again one or two would get detached from a party and with a guide go in search of some special articles.

So well is the firm known for its settings and general carbonizing plant, that many were surprised at the extent and variety of the metal-working departments. As a matter of fact, the firm undertake all parts of gas-works plant, except holders and tanks, and have a large connection with recovery coke-ovens for their tanks, condensers, conveyors, and general ironwork. The new foundry has a moulding floor area of 1800 square yards; and though no work was in progress, a number of top and bottom moulds were shown ready for casting, and all the objects to be cast were familiar ones. Pipe casting is carried on both in horizontal and in vertical positions, though mainly for "specials;" ordinary straight lengths being bought. The various other departments common to all engineering establishments were examined, and need not be described in detail.

It was noticed that most, if not all, of the drilling machines were Halifax productions, made by Messrs. W. Asquith and Co. This firm have in recent years attained a foremost place with these machines; and the high speed at which they worked was freely commented on. The usual planing, facing, sawing, and punching operations were seen in progress; and it was explained that every mouthpiece and its lid are made to fit each other. Here several types of self-sealing lids were exhibited, and the firm's special one shown, and its advantages pointed out. The hinge carries all the weight of the lid; and the eccentric motion is operated from the screw in the centre of the lid, which thus separates all strain of weight-bearing from the eccentric. In tightening-up, the whole lid has a certain amount of rotary movement, and not merely a side movement; so that it tends to a more equable levelling-down of any tar, &c., and ensures a high degree of gas-tightness. Annular condenser tubes were shown in all stages, from the sheets being bent to the finished tube; and riveting was actually in progress for visitors to see how it was done by hydraulic power.

Probably the two operations that in this department excited most interest were the cutting of steel plates by an oxy-acetylene flame, and the pressing-out of steel feeding frames for producer furnaces. After trying various types, the firm now concentrate on the following: A sheet of steel cut to the correct shape, and with a circular hole already made, is placed red hot under a hydraulic press; and when removed from the press, the frame is complete, and needs only a few blows from sledge-hammers to straighten out any bending in its sides. It is then allowed to cool.

The power plant calls for special comment, and received par-

ticular attention. Steam, compressed air, hydraulic power, and electricity are all employed in the various shops; the latter being specially in evidence for cranes, stationary machines, and for lighting. Compressed air is largely used for caulking and chipping hammers and for light drilling, as machines of this description are very portable. For presses and heavier riveting, hydraulic power is used. In general, it may be said that for gas and water tight appliances the riveting is hydraulic; in other cases (hoppers, &c.) pneumatic riveting is employed.

The new electrical power house is 46 feet by 20 feet, with boiler-house adjacent. The plant consists of a Lancashire boiler, 30 feet by 8 feet, fitted with a mechanical stoker, and fed by a special automatic coal-elevator made by the firm. It is provided with a noteworthy automatic damper regulator acting on the coal-feeders, so that a constant pressure of steam is maintained. The boiler is also fitted with economizer and superheater. The engine is of the vertical compound high-speed type, coupled direct to a compound wound generator of 200 kilowatt capacity. From a complex switchboard, current is distributed throughout the works. So nearly automatic is the whole of this boiler's arrangements, that its attendant is able to supervise several other appliances. The hydraulic compressors are also automatic, and keep a steady degree of compression always available, arresting as soon as this is reached, and renewing their work as it falls.

The charging and discharging machine now being supplied by the firm formed the subject of many questions. It had originally been intended to take the visitors to the Sowerby Bridge Gas-Works, to see the combined machine installed there.* The idea was, however, abandoned, as it was felt that the time available was too short. Several machines on order were seen in their earlier stages, and the arrangements of the charging-drum carefully examined (especially in view of the foreign substances previously seen that had been taken from similar machines). Special attention was called to the position of the twin coal-feeds behind the drum, and to the facilities for removing foreign bodies, and how these are prevented from injuring the drum and its blades. Several members, in scrutinizing the contents of the yard, saw hydraulic mains fitted with fixed perforated iron plates, so as to minimize the oscillation of the liquor. These at once suggested reference to the well-known floats designed by Mr. S. Meunier, of Stockport. It was pointed out that these, unlike his, are of metal and non-adjustable, but were in use for some years before the patenting of the Stockport devices.

From the Ovenden works, the company adjourned to the new roof and girder works on the opposite side of the road, where one of the great attractions of the visit was found. Side by side with the slower and older methods of cold sawing, was seen a modern machine by Messrs. Henry Pels and Co., which simply bites through girders as though they were mere biscuits. A similarly powerful and immediately acting machine was in operation biting notches out of steel plates and girders; while other machines were curving rails to any desired radius, or straightening them out. Somewhat more remote from ordinary gas-works practice was the Wilson water softening apparatus, made and placed on the market by Messrs. Drakes. The one seen on Saturday deals with 600 gallons an hour, and softens and purifies all water needed for the works, boilers, &c. It delivers the softening solution in amounts proportioned to the water passing through, and automatically preserves this proportion unchanged, however the rate varies. It needs no cumbersome settling tanks—filtering the water through wood wool—and enables the sludge to be removed easily. It is made in many sizes, and can deal with large volumes of water. At this visit, it proved one of the chief objects of interest.

Before leaving, the visitors were photographed by the works' operator. A complete photographic installation has been provided for reproduction and reduction of plans by electric light, so that all orginals are retained, and, instead of tracings, all working drawings are exact facsimiles of the original drawings.

On the conclusion of the inspection, the company adjourned to Halifax, where, in the Masonic Hall, they were entertained at tea by the firm. Mr. W. A. Drake presided, and was supported by several other Directors and officials. Some local gas engineers would have been present, but for the coincidence of the meetings of the Senior and Junior Associations. This clashing of date was greatly regretted; but the visit had been postponed from the 17th inst., as the date provisionally fixed was found to be inconvenient to the firm. In complimentary speeches, the firm were accorded the warmest thanks of the visitors for their kindness and their very full arrangements for the success of the visit.

* See "JOURNAL," Vol. CXVIII., p. 646.

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It is stated in the report of the United States Geographical Survey on the manufactured fuel industry of the country that of the nineteen briquette plants in commercial operation during 1912, ten used as a binder coal-tar pitch, or mixtures in which it was the chief ingredient, one plant used asphaltic pitch, two used water-gas pitch, and two used no binder. The number of plants using coal-tar pitch as a binder thus exceeded all the others. Inorganic binders, such as cement, have not given satisfactory results; for though they may form efficient cements, they have the serious objection of increasing the ash and adding nothing to the combustible elements of the fuel.

# CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

## Hygienic and Heating Efficiencies of Gas-Fires.

SIR,—We are glad to find in your issue of May 27 that Mr. Yates has at last published certain figures, in response to our request, relative to his "Criticisms on Recent Proposals Concerning Gas-Fire Construction."

At this juncture, we only desire to say that the figures given are decidedly ambiguous—in some cases quite inconsistent; and certain at least of the results (although much information is wanting as to the conditions under which the tests were carried out) are entirely contrary to similar tests made in our own works.

We look forward with much pleasure to dealing with the matter in a complete manner in an early issue.

THE DAVIS GAS-STOVE CO., LTD.

*May* 29, 1913.

## Gas-Fire Construction.

SIR,—Your correspondent, "Enquirer," need not fear any effects of gas fumes on the nickel-plated sheet. One that I have had in use for months is still in splendid condition.

EXPERIMENTER.

*May* 31, 1913.

## Gas Companies and the Motor Fuel Industry.

SIR,—Much to my regret, I am compelled to sail this morning for New York, in spite of the many kind invitations I have had to stop for the meeting of the Institution—including a request from our American Institute that I should remain in England for the meeting as one of their delegates.

I accepted the invitation tendered me to meet the Petrol Substitutes Committee, which represents the various automobile organizations. They are exceedingly anxious that the gas men should at once give serious consideration to the suggestion that town gas be scrubbed free of benzol vapour, and the benzol sold as a motor fuel. To help insure that the matter be considered at the forthcoming meeting of the Institution I have promised Mr. Stenson Cooke, the Secretary of the Committee, that if possible I will write a communication to the Institution on my return journey, and mail it back from New York.

It is my hope that we will be able to be relieved in our country from all candle power standards; and in addition substitute "one million B.Th.U." as the unit of charge to the consumer of gas, in place of the present unit of "1000 cubic feet."

It is my belief that this will make it easier to change the character of our gas, should new conditions arise, without the negotiation of an adjustment of the rate charged to the consumer. We will measure our gas in the present manner, and then multiply the number of cubic feet by the calorific value, and then multiply this product by the rate charged per million B.Th.U.

The automobile industry must have fuel in excess of that to be secured by the fractional distillation of crude mineral oil. The only plans so far suggested, which are reasonably promising, involve the destructive distillation of either coal or fuel oil. Destructive distillation means the production of gas. Gas can be sold only to best advantage by gas companies. Gas companies should be able to sell all other products to equal advantage with others.

The suggestion of serving a deluminated gas may seem radical; but certainly it is the logical thing to do. It cannot be expected, however, that the great public that has not time to consider, or information on which to judge, will either advocate or accept this change without aggressive work on the part of the gas fraternity; and I hope so-called conservatism has not as yet permeated the gas fraternity to the point where they prefer to drift along without change.

The plan is capable of starting a new period of history for the gas business, and there could be no more fitting time for its inauguration than the Jubilee Convention of the Institution.

HENRY L. DOHERTY (of New York).

*En route to Southampton,*
*May* 28, 1913.

## Corrosion of Steel Mains.

SIR,—Under the above heading, you publish a long letter from Mr. William Arnott, of Port Elizabeth, practically condemning the use of steel mains, and quoting the experience of Port Elizabeth and their water-main as an example.

Having only just returned from Port Elizabeth, and also having heard and seen much of this same main, perhaps I may be allowed to add a few words on the subject. Mr. Arnott, in one or two of his remarks, explains the reason of the troubles out there.

To quote from his letter, firstly, he says: "The pipes were supposed to have been dipped in hot bitumen solution and carefully treated." Now, I believe these pipes were treated before being shipped to South Africa; but although they were handled several times (which must and did cause chipping), they were not properly treated again before or after being laid in the trenches, and Hessian cloth was not seen on the work at all.

Secondly, he says: "The main is now being cleaned and painted with hot bitumen and pitch." This is like "shutting the stable door after the horse has been stolen;" for however well cleaned the pipe may now be, the corrosion has gone too far, and the best repair will only be a temporary delay of the necessity of renewing the whole portion.

Thirdly, he goes on to say: "If you were sure of a perfect coating of bitumen, or pitch mastic, then you might feel safer." In almost every work undertaken to-day, if proper care is not taken at the start and all through to the smallest detail, who can possibly expect good results?

From what results I have seen, both good and bad, in various parts

of the world, if necessary I would not hesitate to use steel mains, as I believe if they are properly treated, and instructions are carefully followed, that there is a good life in them.

*Matlock, May* 31, 1913. J. W. BROWN.

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SIR,—The letter of Mr. William Arnott in your last issue may be read with satisfaction by opponents of steel for gas and water mains, but not, I think, with apprehension by those who have actually used wrapped steel tubes. There has been a very large quantity of thin steel tubes shipped to South Africa and other places abroad without any covering at all; but in spite of this, I believe I am right in saying adverse results in the way of corrosion have been at a minimum.

Personally, I think steel tube makers are unwise to sell uncovered pipes, because there is always the risk of isolated cases such as Mr. Arnott describes. It is putting rather a strain on the merits of steel to expect the metal of itself to outlast cast iron of treble the thickness. Therefore, it need not be considered derogatory to submit that a good wrapping is an important part of the steel-tube system. A jute-covered main should be quite proof against corrosion by reason of the wrapping; but I would like to make it clear that the covering of steel tubes is not an acknowledgment that steel inherently corrodes more easily than cast iron—it is merely to supplement a thinner shell.

The following are a few extracts which go to show that it is as easy to find cases of cast-iron corrosion as of steel; also that it is quite possible for Mr. Arnott's 12-inch cast-iron main to "look as good as new," and yet be very badly affected. The following is an extract from a New Zealand letter:—

> The South end of the City of —— is built on low-lying swampy ground, which is particularly destructive to cast-iron pipes. The soil is composed chiefly of decaying vegetable matter, and the district is adjacent to the sea, only a few inches above sea-water level. A hole dug into the soil instantly fills with swampy water almost up to the surface, so that trenching and main-laying under these conditions is a particularly awkward matter. The cast-iron pipes which were originally laid through these flats were a source of endless trouble, for after a time they became quite soft—almost as soft as cheese—so that a hole could be worked right through the shell with an ordinary lead pencil. Consequently, the whole of them had to be exhumed and wrapped steel tubes laid in their place.

The following is extracted from a report by Mr. W. C. Reynoldson, Chief Engineer, Goldfields water supply on the Coolgardie main in Australia, which was laid without any wrapping in corrosive soil:—

> Generally the cast-iron portions (valves and specials and Venturi meters) are more tuberculated and in a worse condition than the steel main itself.

Under the heading of "Corrosion in Other Australian Pipe-Lines," references are made to particulars of a 12-inch cast-iron main of the Metropolitan Water-Works Board, Perth, given by Mr. Faulkner, the Superintending Engineer.

> The pipe was completely encrusted with tubercles to a thickness varying from 1 inch to 1½ inches. The whole surface of the metal under the tubercles, although retaining its original shape, had been converted, to a depth of nearly ¼-inch, to a substance of the resemblance and softness of plumbago.

Referring to the same 12-inch cast-iron main, Mr. E. A. Mann reports as follows:

> It was long thought that cast iron was more resistant than steel, but the graphitic layer in corroded cast-iron pipes has served in many cases to conceal the real state of affairs, hiding the fact that the metal was deeply corroded when it was apparently unattacked.

Further remarks on the relative corrosion of iron and steel occur in the report made by Mr. E. S. Hume, the Chief Mechanical Engineer to Australian Railways, as follows:

> It would appear from experiments that mild steel may now be considered a correct material to use for the manufacture of water-mains.

When commenting on the whole of the above-mentioned reports, "Engineering News," of New York, remarked:

> Some of our readers will be particularly interested in the portions of our abstract dealing with the relative powers of cast iron and steel to resist corrosion, and particularly in the testimony to the effect that mild steel is fully as resistant as cast iron; while the resistance of the latter, as heretofore held by many, is often more apparent than real.

B. R. PARKINSON.

*Finchley, N., May* 31, 1913.

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SIR,—With reference to the letter in your issue this week from Mr. W. Arnott, we should like to make it clear to your readers that the tubes he refers to are not Mannesmann tubes, and are, we understand, made of a different class of material altogether, as well as by a different process. As a matter of fact, it is probably unnecessary for us to point out that our tubes have been in use for a considerably longer period than that referred to in the letter, without the slightest sign of such trouble. Moreover, it is obvious, from Mr. Arnott's remarks as to external corrosion, that the tubes were not thoroughly coated and wrapped, as in the case of our tubes—our system, we claim, rendering them practically incorrodible.

BRITISH MANNESMANN TUBE COMPANY, LIMITED,
per J. T. ALLINGHAM.

*Salisbury House, E.C., May* 29, 1913.

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## Scientific Carbonization.

SIR,—"Consistency" has utterly failed in his letter in your issue of the 27th inst. to produce any tangible evidence for or against the subject under discussion. While giving the "go-by" to the dates and facts set forth in my letter on the 20th inst., he is contented merely to call my claim "belated" as though one word from an anonymous writer, served up in a facetious manner, were "all sufficient."

If "Consistency" (to quote his own words) is "not impermeable to facts," perhaps he might with an effort realize that he does me the injustice of misquoting me, as my claim deals with "methods of charging vertical retorts," whereas he has introduced "carbonization in vertical retorts," which has no bearing on the present topic.

I therefore ask "Consistency" to substantiate through the columns of the "JOURNAL" his statement that my claim is belated, by showing where Dessau retorts were being charged with unscreened coals in the manner described producing the modern small gas pressures within the retort, &c., previous to my claim of the year 1908.

*Elland, May* 31, 1913. H. J. TOOGOOD.

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# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Bishop's Waltham Water Bill, Pontypridd and Rhondda Joint Water Board Bill, Westgate and Birchington Gas and Electricity Bill.

Bills read a second time: Herne Bay Gas and Electricity Bill, Swanage Urban District Water Bill, Gas Orders Confirmation Bill, Gas and Water Orders Confirmation Bill (No. 1), Titchfield District Gas Bill.

Bill reported: Bradford Corporation Bill.

Bills read the third time and passed: Crowborough District Gas and Electricity Bill, Harrow and Stanmore Gas Bill.

## HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Local Government Provisional Order (Gas) Bill, Redcar, Coatham, Marske, and Saltburn Gas Bill [Lords].

Bills reported: Northampton Corporation Water Bill, York Corporation Bill.

Bills read the third time and passed: Bishop's Waltham Water Bill, Mid Kent and East Kent District Water Bill, Westgate and Birchington Gas and Electricity Bill.

The Bournemouth Corporation have petitioned against the West Hampshire Water Bill [Lords].

The Bournemouth Gas and Water Bill, Brumby and Frodingham Urban District Council Bill, Heathfield and District Water Bill, and Tottenham and Edmonton Gas Bill have been referred to a Select Committee, consisting of Sir Henry Kimber (Chairman), Mr. W. E. Harvey, Mr. Hogge, and Mr. George Lloyd; to start sitting to-day.

## NORTHAMPTON CORPORATION WATER BILL.

This Bill was, on Thursday last, ordered by the Unopposed Bills Committee of the House of Commons to be reported for third reading.

Powers are sought in the Bill to construct a new impounding reservoir; the Corporation having come to the limit of their present resources. The new reservoir will be constructed in the valley adjacent to that containing the existing reservoir. The Local Government Board presented a report upon several clauses, one of which relates to an extension of the area of the Corporation's limits of supply. The Board questioned the desirability of taking on what they termed a large extension. It was, however, explained to the Committee that the extension only included the parishes in which the new works of the Corporation would be constructed; and this the Corporation were bound to do.

Another matter raised by the Local Government Board was in regard to clause 33, which deals with charges for water for washing motor cars. This is a departure from the usual clause, inasmuch as it provides for water used for this purpose to be charged for by meter, which is the same as now applies in Northampton to washing ordinary carriages. The argument on behalf of the Corporation was that this would be cheaper to the motor-car owner and better for the Corporation for preventing waste—it being pointed out that, assuming a minimum charge of 20s. per annum, it would need 10,000 gallons to be used by meter at the charge in the Bill before this sum would be reached.

Some discussion also took place before the Committee as to the period for the repayment of the loan for the new reservoir. Sixty years was asked; but the Local Government Board objected. In support of the period, reference was made to an 8-inch pumping main, laid as far back as 1836, and which was still used as a special fire main—being capable of withstanding a pressure of 120 lbs. to the square inch. There is also a proviso in the Bill postponing the commencement of the repayment of the loan, but not the interest, until the completion of the reservoir, or ten years from the date of the Act. This also was objected to by the Local Government Board. Mr. E. Moon, K.C. (the Speaker's Counsel), pointed out that this proposal went a little further than the suggestion of the Repayment of Loans Committee, which was that the sinking fund should be postponed for a portion of the period of construction, whereas here the proposal was to postpone it during the whole period of construction.

All the matters mentioned above, however, were decided in favour of the Corporation. The capital expenditure contemplated under the Bill is £190,000.

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The Richmond Gas Stove Company have recently received an order to supply an extensive installation of apparatus, consisting of gas hot-closets, carving table, wash-up sink, toaster, grill, &c., for the Territorial Depôt, at the Duke of York School Headquarters, Chelsea.

# MISCELLANEOUS NEWS.

## ADVANTAGES OF GAS.

### Dr. Samuel Rideal, F.I.C., States the Argument for the Substitution of Gas for Coal.

At the Sheffield University on Saturday afternoon, the occasion being the annual conference of the Association of Teachers of Domestic Subjects, Dr. Samuel Rideal, F.I.C., lectured on the subject of "The Hygienic Advantages of Gas as a Fuel and as an Illuminant." Lady Edmund Talbot presided over the conference, which was largely attended by teachers and others interested in education from all parts of the kingdom.

Dr. Rideal, whose remarks were illustrated by lantern slides, said there could be no doubt that the important parts of household management, such as the different methods of heating rooms, of artificial lighting, and of cooking, were nowadays very complicated. It was due to details in the methods of the gasification of coal, and changes in the value of the residuals, that cheap gas production was rendered possible in this country. The practical methods of heating and illumination had also undergone great changes in recent years, owing to the rapid application of scientific knowledge. But many of the text-books issued even lately for schools contained statements which were old-fashioned and wrong in favouring the extravagant and dirty coal-fire.

By our ancestors coal was used in its crude state. But better means of utilizing it should be now well-known; and those present, being teachers, must advocate them, and must dispel any ignorance or prejudice that might still prevail. The first licence to dig coal near Newcastle was granted by Henry III. about 1234. A regular carriage of coal to London was not started until 1381. Coal was commonly burned in London in 1400. Even then it was denounced as defiling the city, obscuring the sky, polluting the air and streams, and poisoning the inhabitants. The best fuel was the one which gave the greatest quantity of heat with the least impurities and inconvenience. Hydrogen gas was the ideal fuel. When it was burned, it gave more heat than any other gas; it left no ash; and only produced water vapour. One pound of hydrogen would boil 64 lbs. of water. Ordinary gas consisted largely of hydrogen; and also left no ash. It therefore ranked next to hydrogen as fuel. The way to profit by coal was first to convert it into gas. Thus they avoided waste, inefficiency, and evil results of burning crude coal. In 1911, a total of 184,859,000 tons of coal were consumed in the United Kingdom. Of this, only about 10 per cent. was converted into gas. As it was computed that the soot averaged 2 per cent. of the total weight, nearly 3,700,000 tons of fuel were lost in soot, amounting to over 1½ cwt. per head of the population. In London alone, the annual soot fall was about 76,000 tons. More tarry soot was produced from open fires than in closed grates. For gas and electric lighting during a dense fog in London, the cost was estimated at £10,000 per day. A Committee formed last year to investigate the atmospheric pollution in this country reported that soot and dust fall in London and Leeds amounted to between 300 and 650 tons per square mile per annum; in Glasgow, to 1331 tons; and in Coatbridge, to 1939 tons. When there was smoke, some of the combustible gases from the coal escaped unburnt. This meant a further loss of heat. An important loss was also due to the coating of boiler plates and kettles with soot. A similar economic waste, due to the lowering of the conductivity by oxidation through excessive heating, or sulphur acids in the fuel, also occurred when the corrosive effect caused a layer of oxides to form on the surface of the metal. It was therefore the duty of all teachers to point out that the bottoms of kettles and saucepans must be kept clean; otherwise a serious waste of time and fuel might result. Here the advantage of gas over coal was obvious to everybody. And, moreover, every ton of coal converted into gas gave about 10 gallons of tar for tarring the roads. The same causes to which he had referred occasioned with coal-fires an expense for renewal of parts of the grate, and of the utensils. From bad stoking, there also frequently arose great waste of fuel.

There was always some moisture in coal, although it might feel dry. But sometimes it was fraudulently wetted to increase the weight. The moisture in different coals varied from less than 1 up to 7 per cent.; and it had often been suggested that some legal control should be introduced by which no coal should be permitted to be sold containing more than 5 per cent. House coals should not contain more than 1 per cent. of water in summer, and 2 or 3 per cent. in winter. He was afraid, if the amount of water was determined in the coal sold in small quantities to the poorer consumers, they would find that, in this method of distribution, adulteration by water, either by accident or design, was of frequent occurrence, and that more water was sold as coal than as milk to the public, especially in rainy weather. If there were 5 per cent. of water, 100 lbs. would contain only 95 lbs. of real coal; and ½ lb. of this would be required to boil off the 5 lbs. of water, so that only 94½ lbs. of the coal would be really effective. One of the greatest evils attached to the burning of coal was the presence in it of sulphur (chiefly as pyrites), which was burnt to sulphurous acid, and passed out into the air. This acid was extremely noxious to vegetation. In the moist atmosphere, it was further oxidized to sulphuric acid, which rendered the rain of towns always more or less acid and destructive of nearly all materials. Each year about 200,000 tons of sulphur were emitted from the burning of coal in London. The amount of sulphuric acid contained in a year's coal smoke in the British Isles was three million tons, a great part of which was showered down in the rain. In Widnes, this contamination was found to be 120 tons per day. Besides the injury caused, this was a waste of sulphur. On the other hand, in the use of gas the main part of the sulphur was recovered in the purification.

Dense black smoke from factory chimneys was always a sign of avoidable waste. Abatement of smoke meant a saving in the coal bill. Since Siemens introduced his regenerative gas-furnace in 1863, gas had been very successfully used in a variety of industries, and had been proved to be so economical that older methods of heating had been entirely abandoned. In steam generation, and in most manufacturing processes, an economy of at least 25 per cent. could be attained by the gasification of the coal before use. Sheffield, in 1890, was called a "Suburb of Hell." There were more than 4000 chimneys serving boilers and furnaces of all sorts pouring out day and night dense volumes of black smoke—sometimes 40 minutes in the hour. The greater part of this had now been altered; and in 1907 Sheffield had 1428 hours of sunshine, which was more than any other large city or town in the centre of Great Britain; the average excess of sunshine being 273 hours.

The general use of gas for heating would abate public nuisance attending the removal of house refuse. Dr. Kenwood, the Medical Officer of Health for Stoke Newington, told him the other day that if there were no dustmen in his district, a penny rate would be saved. If all organic refuse was got rid of by "gas-cremators" in houses, the amount of ash to be removed would be considerably reduced, and would cost comparatively little. The lecturer quoted from the results of experiments made in Glasgow in 1909 for the purpose of ascertaining which was the better for heating houses—coal or gas—as regards efficiency, healthiness, and economy, and the question was decided in favour of gas on all the points raised. They had confirmation of the fact that the intensity of radiant heat emitted from a gas-fire was very regular, while that from a coal-fire was subject to extreme and rapid fluctuations. The radiating power of the gas-fire was also much more speedily developed than that of the coal-fire; and that of the gas-fire was a controllable and definite asset, while that of the coal-fire was an indefinite quantity. At least 75 per cent. of the total heat generated by the combustion of coal in an ordinary domestic fire was lost in the form of flue heat. The volume of the current up the chimney from a coal-fire averaged 17,500 cubic feet per hour. This changed the air of the room ten times every hour—far in excess of what was required for adequate ventilation. It occasioned draughts, and resulted in great loss of heat, while it did not ventilate properly, since such an excessive pull must increase short-circuiting between the door, the windows, and the chimney. With a radiant gas-fire the volume passing up the flue was equivalent to an average change in the air five times in an hour, which was hygienically quite satisfactory. Two objections sometimes made to gas as a domestic fuel—that it caused contamination and undue dryness of the air—were not founded on fact. There was no contamination; and it was demonstrated that gas-fires exerted no more drying effect on the air of a room than coal-fires. The cost of heating by gas compared very favourably with the cost of heating by coal. For all reasons the smoke-producing, wasteful, domestic coal-fire must be replaced by the cleanly and healthy gas-fire.

After dealing with various text-books (many of which, Dr. Rideal said, were at least twenty years behind the times) on the subject of gas fires and heating, he spoke of the importance of teaching correctly these lessons. Smoke, he proceeded, was the direct cause of disease, since it led to conditions which conduced to many forms of illness, especially of the respiratory organs. One out of every five of the London fogs was entirely caused by smoke, and every town fog was intensified by it. A series of bad fogs immediately sent up the death rate—sometimes doubling it. A Glasgow fog in 1909 was held guilty of 1063 deaths, while a London fog was estimated to have occasioned or aggravated 30,000 cases of illness. In the heart of London, some 83 per cent. of the sunshine so necessary for health was lost, through the persistent smoke haze.

In a series of comparative trials on a practical scale of the relative hygienic value of gas and electric lighting, Dr. Rideal said he had proved the following:—

(1) When there was whitewash on the ceiling or walls, as in schoolrooms, it was able to absorb all the sulphur products of gas combustion for a long period; and the power would not generally be exhausted for 25 years.

(2) Although gas combustion originally developed more heat than electricity, the final result was equalized in the following ways: (*a*) The greater diffusion caused by gas; (*b*) the ascending currents from the gas-lights when they reached the ceiling rapidly parted with their heat, which was conducted away by the rafters and joists; (*c*) the electric lamps really produced more heat than was commonly credited to them.

(3) The bacterial content of the air of rooms was less with gas than with electricity, owing to (*a*) charring of the organic matter, and cremation of the organisms in the gas-flames; (*b*) the sterilizing effect of the sulphur acids from the gas; (*c*) increased condensation on the surfaces removing organisms together with sulphur products. As a consequence, the condensed moisture under electric light contained a number of living organisms, while that under gas was sterile.

At the present time, when so much attention was being directed to the healthy home, town planning, and suburban development, the subjects of heating, lighting, and air pollution were of immense importance. It was the business of every householder, as far as possible, to discontinue the use of domestic coal. In London, the gas consumption was now over 8000 cubic feet per head of the population per annum. This was far above other cities of the world, and smaller towns in the provinces. The increase in London was mainly due to the development in the use of gas for cooking and heating; and he hoped special educational efforts would be made by other towns to imitate this example.

## No Electric Light for Banbridge and Dromore.

As the result of the Board of Trade inquiry held by Inspector G. B. Deane at Dromore (co. Down) recently—as reported in the issues of the "JOURNAL" for April 22 (p. 271) and April 29 (p. 346)—the Board, after considering the Inspector's report, have decided not to grant a Provisional Order to the Urban Council under the Electric Lighting Acts. There is a consensus of opinion in the town that the Council will not proceed further with the scheme. The Order applied for by the Banbridge Council has also been refused.

## NOTTINGHAM GAS-WORKERS' AGITATION.

In view of possible grave developments, arising from the strained relationships between the Nottingham Corporation and a section of the employees formerly engaged in the gas-meter repairing shops, there was evidence last week of serious unrest among the whole body of workers connected with the city's chief municipal trading concern. The comparatively unimportant incidents which culminated in the lock-out of tinsmiths at the Woodborough Road depôt had been magnified on a scale illustrative of the elasticity of trade union lenses; the Nottingham and District Trades Council spending considerable time on Wednesday in discussing the situation, under the chairmanship of Mr. Arthur Hayday, who made it clear that common cause was, if necessary, to be waged in the matter by the larger body of workers engaged in the actual making of gas. There was contained in his speech also an ominous reference to possible drastic action, following upon a meeting of the District Committee which it was intimated had been convened to be held in the course of a few days.

The delegates had the opportunity of hearing for the first time the Town Clerk's official reply, following upon the conference recently held at the Guildhall. Mr. Board's communication, sent by the authority of the Gas Committee, stated that, having heard the report of the Sub-Committee relative to the investigation of the complaints made by Mooney, the foreman of the shop, against Mr. Gordon (the Secretary of the Metal Workers' Union), and by the men against Mooney, the Committee were of opinion: (1) With regard to the complaint against Mr. Gordon that both he and Mooney were to blame; and the statements were made in the heat of the moment, and were of a personal nature not affecting the Committee. (2) As to the complaint against Mooney, the Committee were of opinion that, without intending to interfere unduly with the men, Mooney had not exercised the tact he might have done in the discharge of his duties; and that, with a view to the harmonious working of the shop, Mooney be instructed to exercise greater discretion in the future. But this, it has been since made apparent, will not satisfy the recalcitrants, whose demand for the removal from the depôt of the non-unionist—the original cause of the trouble—is being persisted in as a condition precedent to the resumption of work.

However, those who speculated upon possible vacillation on the part of the Gas Committee, have "reckoned without their hosts." The interests at stake are too great to be lightly dealt with; and the Committee, at their meeting on Friday, when the position was again reviewed, arrived at a decision which is not limited in its significance to merely local considerations. The case of the Nottingham tinplate workers has been taken up by the National Union representing this branch of industry, and may easily become part of a wider propaganda having for its purpose the entire elimination of non-union labour in connection with gas undertakings. The Committee have therefore served a useful purpose in furnishing an official account of the whole of the incidents leading up to the trouble. A perusal of the narrative shows that, apart from the original cause of the dispute arising from the continued employment of a non-union hand, there was much personal bitterness, as represented by the feeling existing between the foreman of the shop and the Secretary of the Union. It is, however, upon the first point that the general interest in the matter naturally arises. The official statement, which is of considerable length, makes it clear that every means was exhausted by the Committee and their principal official (Mr. John Wilkinson) in order to secure an amicable adjustment of matters. Incidentally, exception is taken to the men's employment of the term "lock-out"—it being shown that it was they who had failed to conform to the reasonable requirement as to the time at which work was to be resumed, and had barred the door to a prompt settlement by the declaration that the matter had passed from their hands into those of the executive of the National Union. The pacific attitude which had been adopted by Mr. Wilkinson throughout the difficult negotiations, is reflected in the correspondence now available for public perusal.

In the final paragraph of their report, the Committee say: "The real point is the question of principle, whether a non-unionist (Spencer) shall be allowed to continue to work with members of the Union. As has already been explained, the Committee have no complaint against Spencer. He has been in the employ of the Corporation over fourteen years, and is a competent workman; and while they are prepared to sympathetically recognize the trade union, they are unable to dismiss Spencer because he declines to become a trade unionist."

### Threatened Extension of the Trouble.

While the attitude of the Committee remains clearly defined, there is not wanting evidence upon the part of the most active of the trade unionists to extend the area of the trouble and to involve within its train, if necessary, the whole body of gas workers employed by the Corporation, and also those engaged at the chemical works at Giltbrook. The gravity of the situation was emphasized by the circumstance that, concurrently with the publication of the report, Mr. Will Thorne, M.P., came down specially to Nottingham to confer with the District Secretary and others; the members of the local Executive holding a conference on Saturday afternoon, when a proposal was favourably entertained to ballot the whole of the gas workers in the city, with a view, if necessary, to a strike in sympathy with the tinplate operatives. Mr. Thorne, in a Press interview, had caused it to be previously known that, in his judgment, the Gas Committee were laying themselves open to serious criticism in consequence of the statements they had been responsible for issuing. Permission, he added, had been readily accorded by the Central Executive for the suggested ballot of the Nottingham workers; and the position is rendered the more ominous from the fact that there has been a considerable feeling of unrest evident for some time past among other sections of municipal employees. Saturday's gathering was followed on Sunday morning by a larger assembly representative of all the trade unionists employed in connection with the Corporation gas undertaking. The result of the deliberations was the determination to request the Gas Committee to receive a deputation representing all trade unionists in the department, and, failing a satisfactory settlement by these means, to ask the Mayor to convene a special meeting of the Council for the purpose of hearing the delegates. Lying beyond this, is the ultimate design, if necessity demands, to take a ballot of the whole of the Corporation workmen, with a view to a general strike; the formidable threat involved being the holding-up, not merely of the gas supply, but the tramway and other public undertakings. Judging from their present composition, however, there can be no doubt that other Committees of the Corporation will prove no less inflexible than the Gas Committee in resisting the illimitable tyranny of trade union methods.

## BELFAST CORPORATION GAS UNDERTAKING.

### Annual Accounts of the Gas Department.

The accounts of the Gas Department of the Belfast Corporation for the year ended the 31st of March have been completed, the result being as follows: The gross profit on the manufacture and sale of gas and residuals is £83,817; being an increase of £14,475 compared with the year 1911-12. To this must be added interest received from the Belfast Banking Company, £1292, and the profit on the working of the stoves department, £350; making a total of £85,459. From this has to be deducted the dividends and interest on capital, £13,336, and the equivalent of interest on redeemed stock, £5491—together, £18,827—leaving a net profit of £66,632, being an increase of £14,167 over the amount this time last year. Adding the balance brought forward, £19,353, there is produced a total of £85,985. Out of this the following amounts have been set aside: Sinking fund, £6617; cost of twenty-eighth issue of stock, £3858; reserve for insurance of works, £1664; contingent renewal fund, £3120; and reserve fund, £30,000—making a total of £45,259, and leaving a balance of £40,726. The Gas Committee have contributed for public purposes, to the Finance Committee, in aid of rates, £10,000, and in dividends and sinking fund on the New City Hall stock, £11,385; making together £21,385, and leaving a balance at the credit of the profit and loss account of £19,341.

## LEEDS CORPORATION GAS UNDERTAKING.

### A Record Year—Surplus of £36,000.

The accounts of the gas undertaking of the Leeds Corporation for the past financial year were submitted to the Gas Committee at a meeting held last Tuesday under the presidency of Alderman Penrose-Green, the Chairman. They showed a record profit; the exact amount of the net surplus being £36,032, compared with £22,222 the preceding year. This is the largest sum realized in the history of the undertaking; the nearest approach to the figures having been in 1895, when £33,000 was the surplus. The total revenue for the year amounted to £418,511 in round figures, and the total expenditure to £283,460. The gross profits were thus £135,050, compared with £118,160 a year ago. Out of the gross profits are paid the following sums: Income-tax, £3631; interest, £44,215; redemption fund, £43,339; revenue contribution to capital outlay, £4437; vertical retorts, £803; and provision for repayment of stoves, £2592—total, £99,018. After deducting these payments, there is left the surplus of £36,032 already mentioned. Not all of this, however, is likely to go in the relief of the rates. The Committee are pledged to pay £5000 of it as the first instalment of the £16,000 required for the installation of Dessau vertical retorts at the Meadow Lane works, the cost of which is to be spread over three years, after which it is expected to pay for itself.

A notable feature of the accounts in relation to capital expenditure is the reduction of the net debt—no less than £150,000 in five years. This reduction in the last twelve months is as much as £44,684. The debt now stands at £1,176,681. Up to March 31 last, the total capital expenditure had been £1,945,296. Last year the sum of £8977 was spent on capital account, chiefly on extension of mains, meters, and stoves; but against this a sum of £10,531 was provided out of revenue.

The amount received from the sale of gas last year was £11,000 more than in the previous similar period. An increased demand for gas-stoves is also to be noted. On the other hand, the prices for residuals have been weakening of late; and this circumstance, together with the extra amount that has now to be paid for coal, will militate against the production of big profits at the end of the current financial year. About 320,000 tons of coal are purchased yearly for the gas-works; 20,000 tons being stored for the winter. Contracts for the supply of a large quantity have already been entered into, at from 2s. 4d. to 2s. 6d. a ton advance on the 1911 prices; and negotiations are pending with respect to the remaining requirements.

## COVENTRY CORPORATION GAS UNDERTAKING.

### The Past Year's Working—Prospective Extension of the Works.

The report of the Gas Committee of the Coventry Corporation for the past financial year was presented, with the accounts, at the meeting of the Corporation last Tuesday. The accounts showed a reduced profit as compared with the previous year.

Alderman Batchelor, the Chairman of the Gas Committee, in submitting the accounts, remarked that the report the Committee had to present was not quite so good as some of its predecessors. The reason was largely due to the higher price paid for coal, which amounted during the last two years to an extra 3s. per ton. A great difference had thus been made; but the full effect of it would not be felt till the end of the present year. With regard to the reduction made in the price of gas last year, it was pointed out that it was then estimated that this would make a difference of £8000. The actual amount had been £8406. Yet there was only a reduction of £307 in the total sales. The increased consumption over last year was 76 million cubic feet, or 7·94 per cent. The net profit would have been £8406 more had it not

been for the lowering of the price; but the consumers had, of course, benefited entirely to this extent. The increased consumption had been made up as follows: Consumers through ordinary meters, 33,818,000 cubic feet, or equal to 5·05 per cent.; through prepayment meters, 39,477,700 cubic feet, or 14·77 per cent.; and public lighting, 3,066,247 cubic feet, or 11·8 per cent. From these figures it would be seen that the slot meters continued to be very popular; while there was the further encouraging fact that manufacturers were finding out fresh uses for gas, the reduced price of which stimulated its application. During the past year, owing presumably to the price of petrol, gas had been used in factories for the testing of motors. It had proved satisfactory in this respect, and no doubt there would be an increased demand for gas in the future, inasmuch as inquiries had been made as to its use, and for the installation of plant for other purposes besides the one mentioned. The net result of the year's trading was a profit of £20,298, against £23,670 last year—a decrease of £3372. The present capacity of the works was for an output of 5½ million cubic feet per day, though at a push they could produce 5¾ millions. The maximum daily output during the past year had been 4,480,000 cubic feet; and if the present rate of increase was maintained, by the winter of 1915-16 their absolute limit would have been reached. To build an additional section would take about two years, and the estimated cost was £80,000. Therefore the addition must be commenced during 1914. The point was emphasized that, if in the future they were to sell gas as cheaply as possible, and also to hand over substantial sums to the rates, it would be necessary to pay for the extension largely out of profits. The reason for recommending a considerable amount (£5000) to be placed to reserve this year was in order that it might be available for future extensions which would become inevitable. Reference was made to the amount of plant that had been scrapped at the old works, and for which provision was being made to the extent of £67,000. The Gas Department was fortunate in being able to do this out of profits. The whole of the gas undertakings in the country that were considered to be well managed were doing as much as possible to reduce capital cost s; and wherever this had been done, the best results had followed. Not only had business proceeded on sound lines, but the ratepayers had also benefited both in grants to the rates and in the low prices of gas charged to consumers The Committee asked to be allowed to continue this policy, in which event there need be no fear as to the stability of the undertaking, both in regard to contributing sums in relief of the rates and in selling gas at a low price. The latter was, no doubt, a big factor in inducing manufacturers Personally, he wished they could have reduced the price earlier than they did. He certainly thought it would have increased the facilities for Coventry manufacturers in competing in the open markets of the country; and for this reason he hoped the present policy would be maintained.

Mr. WHITE, the Vice-Chairman of the Committee, in seconding the adoption of the Committee's report, drew attention to the fact that during the year under review no less than £33,000 was received from the prepayment consumers. The desire of the Gas Department was, he said, to produce gas as cheaply as possible; but they could not do this unless they paid great attention to capital and capital charges. The people who bought their product ought to have first consideration at their hands.

The report, in which the Committee recommended that £5000 out of the year's profits should be handed over to the general district fund in relief of the rates, that £10,000 should be set aside to meet the loss of capital consequent upon the abandonment of plant at the old works (making, with the amounts already allocated for this purpose, £58,000), that £5000 be placed to the reserve fund, and that the balance should be carried forward, was adopted unanimously.

## BINGLEY GAS UNDERTAKING.

### The Past Year's Working—The Public Lighting.

At the Meeting of the Bingley Urban District Council on Monday last week, the financial statement in regard to the gas undertaking was submitted. In moving its adoption, the Chairman of the Gas Committee (Mr. Hall) said the total quantity of gas made during the past year was 133,275,800 cubic feet, of which 121,566,300 cubic feet were sold, compared with 115,696,200 cubic feet in the preceding year. The receipts from the sale of gas were £11,652, against £11,631, with the price 2d. per 1000 cubic feet more. Residuals had realized £5091, compared with £3941; and the total revenue, including the value of stocks in hand, was £19,334. The gross profit was £2391, and the net profit £1522. The transfer of this sum to the reserve brought up the fund to £7200. Mr. Hall pointed out that during the present year £5500 would be taken from the reserve to pay for the cost of alterations and extensions at the works which were now being made; and, under these circumstances, he said it would not be wise to consider any proposal for a further reduction in the price of gas. The motion was carried.

The Gas Committee brought forward a recommendation that an existing resolution by the Council dealing with the public lighting in the district during the months of June and July should be rescinded. By the resolution, lighting was practically suspended for the two months named, with the exception of the lamps in Main Street. The Council having rescinded the motion, Mr. Hartley moved that the lighting be continued during these months throughout the whole of the district; the times to be regulated by the Gas Engineer (Mr. J. Stephenson). The action of the Council on this matter, he said, had been false economy, and he believed that Bingley had well earned the distinction of being a city of darkness. Mr. Garnett, who seconded the motion, said it was well known that representations had been made by the police authorities to the effect that the system of non-lighting was not for the moral health of the town. In answer to a question, Mr. Hall said the extra cost would be about £200. Mr. Whitwham, as an amendment, moved a restricted system of lighting—saying that the cost of the proposal was too large for the benefits to be gained. The amendment was defeated, and ultimately the motion was carried by a large majority.

## CLITHEROE CORPORATION GAS SUPPLY.

### Gas Manager's Annual Report—Reduction in Price.

Mr. Robert Barrett, the Gas Engineer and Manager of the Clitheroe Corporation, has presented to the Gas Committee his report on the gas undertaking for the year ended the 25th of March last. The gross revenue was £14,060; and the gross expenditure, £8398—leaving a gross profit of £5662. The net profit is £3647—an increase of £1012. The revenue from gas sold for all purposes was £9691, compared with £8877; and from residuals, £3935, against £3268. During the year, 7211 tons of coal were carbonized, compared with 6915 tons in the year 1911-12. The total quantity of gas manufactured was 79,079,600 cubic feet, or 4,240,600 cubic feet more than in the preceding year; the make per ton being 10,966 compared with 10,822 cubic feet—an increase of 144 cubic feet. The gas sold was 75,209,400 cubic feet, or 4,638,790 cubic feet increase. The gas unaccounted for was 3,161,777 cubic feet, or 4 per cent., compared with 4·66 per cent. in 1911-12. The residuals made per ton of coal were: Coke and breeze, 13·75 cwt.; tar, 11·87 gallons; and liquor, 23·22 gallons. The capital expenditure per ton of coal carbonized was £9 9s. 4d.; 17s. 3d. per 1000 cubic feet of gas made; and 18s 1d. per 1000 cubic feet sold. The gross profit averages 8·29 per cent. upon the total capital employed.

The Gas Committee decided to reduce the price of gas to 2s. 4d. per 1000 cubic feet to prepayment as well as to ordinary consumers, and also to transfer £500 out of the profits in relief of the rates. The Chairman remarked that, notwithstanding the increased cost of coal, the undertaking had made a record profit; and he warmly congratulated Mr. Barrett on the excellent result of the year's working.

## MOSSLEY CORPORATION GAS UNDERTAKING.

### Annual Report of the Engineer and Manager.

Mr. James Taylor, the Gas Engineer and Manager to the Mossley Corporation, has presented to the Gas and Lighting Committee his report on the working of the undertaking in the year ended the 25th of March last. It furnishes the following particulars.

The gross revenue was £25,196, and the gross expenditure £19,946; leaving a gross profit of £5250. Deducting the instalment to the sinking fund and the interest on loans, amounting together to £4527, the net profit for the year is £723, of which £700 has been transferred to the borough fund. There was an increase of £1449 in the amount received for residuals, and of £776 in the gas-rental; the latter being due entirely to the extended use of gas for cooking and heating purposes. The total number of meters fixed up to March 25 last was 7708, compared with 7506 at the corresponding date in 1912. The quantity of gas sold through prepayment meters was 25,432,300 cubic feet, against 22,751,700 cubic feet in 1911-12, and 19,201,900 cubic feet two years ago.

With regard to the works, Mr. Taylor says the cost of purification has been steadily reduced in the past few years, owing to the more scientific methods employed. In 1912-13, the reduction was almost 50 per cent. compared with 1911-12; and he considers it probable that further saving may be effected. A serious explosion occurred at the works on the 29th of August last, during the repair of a gasholder. Unfortunately, three workmen lost their lives, and great damage was done to the holder. While recording this calamity, Mr. Taylor points out that the works have in the past been singularly free from accidents involving serious bodily injury or loss of life. The maximum quantity of gas delivered in 24 hours during the past year was 751,400 cubic feet, on Dec. 2; and the minimum quantity 203,800 cubic feet, on July 28. It is interesting to note that, whereas formerly the minimum demand for gas was always within a few days of June 21 each year, it now occurs in the wakes' holiday week. This alteration in demand is caused by the increased use of gas for cooking, which has raised the output of gas in the months of June and July by 35·7 per cent. compared with four years ago.

The quantity of coal carbonized was 13,729 tons, and, in addition, 1104 gallons of benzol were used in the production of 154,483,500 cubic feet of gas—an increase of 2·77 per cent. on the preceding year. The total quantity of gas sold (including that used on the works) was 140,949,300 cubic feet, or 10,252 cubic feet per ton of coal carbonized. The gross profit on the year's working was 8·94d. and the net profit 1·23d. per 1000 cubic feet of gas sold.

## TIVERTON CORPORATION GAS UNDERTAKING.

### Local Government Board Inquiry.

Last Tuesday, Mr. R. H. Bicknell, M.Inst.C.E., held an inquiry into an application made to the Local Government Board by the Tiverton Corporation for sanction to borrow £2900 for the purpose of extending their gas undertaking. The Town Clerk (Mr. C. Marshall Hole) stated that the area of the borough was 17,679 acres, and the population at the last census 10,209. The assessable value was £42,704. The Surveyor stated that there was an overdraft of £232, and that current liabilities for the work on meters and stoves had been met out of capital. The Town Clerk said that works of a permanent character had been going on; and if the Council made application from time to time for money in respect of each item, it would entail considerable trouble. They had had great difficulty in keeping the water of an adjoining river from percolating into the gas-works. Considerable outlay had been incurred in making a concrete wall; and he suggested that the cost (about £170) should be added to the loan. The Surveyor remarked that the work had reduced the percolation by about 75 per cent. The Inspector said he thought the matter would prove a proper subject for a loan. He gathered that the work which had been completed was successful. In the first place, the Board would require a

resolution for the £170, and then details as to how the amount was made up; also plans and sections showing how the work would be carried out. He subsequently went over the details of the amount for which application had been made.

## SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

### Improved Business and Financial Position.

The Ordinary General Meeting of the Association was held last Wednesday, at the London Offices, No. 90, Cannon Street, E.C.—Sir DANIEL F. GODDARD, M.P., in the chair.

The SECRETARY (Mr. William Cash, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said he did not need to say much on this occasion about the accounts, because he thought, if the shareholders had looked at them, they would have considered them very satisfactory. What was more, they realized very thoroughly the prognostications he ventured to make at the last annual meeting. He then expressed the hope that the Company had reached the bottom of the bad times at Port Elizabeth; and those shareholders who had read the report would have seen that the Company had now well turned the corner, and were on the road to further improvement. They had had a very good year. On the last occasion, he had to report a decrease (he hoped it would remain the last decrease) of 5·6 per cent. in the year's output of gas in Port Elizabeth. In 1912, the corner was turned; and at this meeting, he was able to report an increase of 4·5 per cent. He trusted that they were well on the way to better times. At Grahamstown, the increase of business had always gone on. It was not subject there to the same depression as at Port Elizabeth. At the previous meeting, he reported an increase there of 5 per cent.; and this year, he had to announce one of 7¼ per cent. He was happy to say that life there was very active. The colleges were filling; and there was every sign of a growing and important town. In regard to the accounts, there was an increase at Port Elizabeth in money, as well as in output, from the sale of gas of £627; and at Grahamstown of £192—together £819. One regrettable point he must just allude to, because he generally had had to do so—that was, the item of unaccounted-for gas at Port Elizabeth. He explained at the last meeting the difficulties with which they were confronted in dealing with this. A source of leakage had been discovered; and they had taken prompt and effective steps to try to reduce it. At the present time, the reduction was good; but there still remained uncorrected unaccounted-for gas to the extent of something like 15 per cent. Mr. Brown, who had been out in Port Elizabeth managing their works for them during the twelve months that Mr. Arnott had been home, was present at their meeting that day. He told them that the source of part of the 15 per cent. had been found in one of the mains. A very high tide appeared to have washed the pipe clear; and some children, or some mischievous persons, found the tap, opened it, and, before this was discovered, a good deal of gas managed to escape. Having already made a considerable change in the quantity of the unaccounted-for gas, he hoped that next year he should be able to say that they had eventually "collared" this very serious difficulty, and had brought down the figure to something like a normal amount. The profits, as would be seen, were £7617 at Port Elizabeth; and this compared with £5782 in the previous year. At Grahamstown, the profit amounted to £3534, which was a slight reduction on the previous year. But for 1912, they had £10,650 as the total profit, against £9812 in 1911. Part of the decrease in the Grahamstown profit was due to the considerable reduction in price—5d. per 1000 cubic feet—to which he referred at the last meeting. It was made at the beginning of 1912, and continued, with great advantage to the Company, throughout the year. From the commencement of the current year, they had made a reduction in the charge at Port Elizabeth. It was now 7s. 11d., as against 8s. 9d. This was a very large reduction; but it was not all, because there was 7½ per cent. to come off the 7s. 11d. What it amounted to was that they were now getting a flat-rate of 7s. 3½d. at Port Elizabeth. Their officers reported to the Board that every month they were now showing improvements, in consequence of the reduction; and the Board hoped therefore that, at the end of the year, there would not be a large deficit on account of the reduction, but that they would find a greater popularity for their primary article of commerce. Last year the average price paid for coal was less. At Port Elizabeth it was £1 12s. 7d. per ton, compared with £1 16s. 9d. This was due to the fact that they had begun to use colonial coal. Mr. Brown had made careful investigations; this being one of the objects for which they sent him to South Africa. He had found one satisfactory coal; and the Company used 853 tons of it last year. This accounted for the reduction in the average price of the coal used. The colonial coal did not yield such a large quantity of gas per ton as English coal. But it was a fair coal with which to work; and the lessened yield only meant that they would have to use a little more of it to produce the quantity of gas required. The price, however, was so much less that there would be advantage to the whole undertaking in employing it. The Directors had entered into contracts for more of the coal; and so more would be used. He hoped by this means the Company would not have to suffer at all from the present high price of English coal. Although they were buying a certain quantity at the high price, they were buying a larger proportion of colonial coal, which would bring down the whole cost to a very fair figure. Concerning the make of gas, Mr. Brown was very much to be congratulated on this. At Port Elizabeth, he turned out 11,885 cubic feet per ton of coal—taking the English and colonial coal together. This was better, he believed, than they had ever done before. The best British companies looked for something rather better than this; but a good average British company did not obtain a higher figure than 11,885 cubic feet. From the English coal, without the colonial coal, they had made at Port Elizabeth considerably above 12,000 cubic feet of gas per ton. As he (the Chairman) had said, Mr. Arnott had been home for a year; and the Board had had several conferences with him. He was now again in charge of their works and business; and Mr. Brown had returned home. Mr. Sterley, who was their chief accountant and cashier in South Africa, was also present with them that day. If the shareholders had to read all the correspondence that the Board received, and saw all the details of the business that went on, they would agree that it was no sinecure to be either the manager or the accountant of an undertaking of this kind in South Africa. They were very pleased to have Mr. Sterley with them for a period. This was not Mr. Sterley's native land, as he was born in South Africa; and he was now visiting the mother country for the first time. Turning to other financial matters, the Board had placed to reserve £1000, as compared with £500 the previous year. They were also proposing a dividend of 9 per cent., against 7½ per cent. last year. Therefore he felt the Directors were doing fairly well for the shareholders. The Board had also written £750 out of reserve on account of the depreciation of reserve investments. Now the reserve investments stood a little below the market price at the present time. After paying the dividend recommended, £2160 would remain to be carried forward, as compared with £1500. He need not say anything more. Good wine needed no bush; and he thought that these accounts did not require anything to commend them. He hoped the shareholders were satisfied.

Mr. ANDREW L. DON seconded the motion.

Mr. SAMUEL WHILE asked how much gas the colonial coal produced per ton.

The CHAIRMAN replied that it varied; perhaps Mr. Brown would say.

Mr. J. W. BROWN: On the average, 10,500 cubic feet.

Mr. JAMES CLOUDSLEY congratulated the Directors upon the improved position of the balance-sheet. He hoped this was the beginning of the putting of the Company in a different position from what it had been in now for some time past. He thought certain of the shareholders had been unduly afraid in regard to their property, and had sacrificed their shares when they ought to have kept them. These former shareholders should know what the Chairman had had to tell the meeting on this occasion. As had been heard, the Company had turned the corner; and, in his opinion, the concern was now on a sounder basis than previously, when they were only dependent on one or two sources for their income. He might be wrong; but it seemed to him that a company with £90,000 and £40,000 in reserve ought to be in a very good position indeed. At one time, he could have sold his shares for £16 or £17; but he did not do so. Now they were going back to the position which prevailed at that time. All that was wanted was confidence on the part of the shareholders. There was good ground for the shareholders congratulating both themselves and those who managed their affairs.

The CHAIRMAN remarked that it was quite true they had now got to what might be called thoroughly solid lines; and all they had to do was to put energy and goodwill into the business. They had fairly met the competition of the electric light by giving attention to the consumers, and bringing before them the latest economical and efficient appliances. By continuing on these lines, they would be able to maintain their position.

The motion was unanimously carried.

The CHAIRMAN moved the declaration of a dividend of 9 per cent., subject to income-tax, and less the interim payment. He mentioned that previously the income-tax was paid by the Company; but the fact that the dividend was to be subject to income-tax partly accounted for the payment of a larger dividend than before.

Mr. HENRY WOODALL seconded the motion, which was unanimously carried.

The CHAIRMAN proposed the re-election of Mr. Henry Woodall as a Director. His great knowledge of gas undertakings and of the gas industry made him an invaluable member of the Board.

Mr. CLOUDSLEY seconded the motion, which was heartily passed.

Mr. WOODALL, in thanking the shareholders, said he valued the office because it gave him the opportunity of improving upon the lessons he had learned through life's career. He also desired, as a Director, to express his obligation to Mr. Brown for the good service he had rendered in South Africa. Mr. Arnott was an excellent man; he (Mr. Woodall) did not think they could find a better one. But at Port Elizabeth, Mr. Arnott was isolated from his fellows, and had a long way to go to find another man with whom to exchange opinions. As iron sharpeneth iron, they found Mr. Brown had been able to bring up a number of points for consideration, from which he (Mr. Woodall) was sure the Company would derive much advantage. He was certain the Directors did wisely in sending Mr. Brown to South Africa.

Moved by Mr. G. CRISPE WHITELEY, and seconded by Mr. W. RICHARDS, Mr. Percival D. Griffiths, F.C.A., was re-elected auditor.

Mr. G. CRISPE WHITELEY moved a resolution cordially recognizing the services of the Board and officers, all of whom had done so well for the Company generally. The shareholders had listened with satisfaction to the hopeful and improved state of things in connection with the condition of the concern. Even in adversity, they had never hesitated to express their thanks and approval, because they were sure that those who were working for them were doing their very best in the adverse circumstances. He did not think they could add to the value of the resolution now that things were in better state; but perhaps they could pass the resolution in a brighter spirit and with a little more heartiness. To those who were present, and who had helped to bear the heat and burden of the day in South Africa, the shareholders gave cordial welcome; and they wished them to understand that their resolutions of thanks were not mere matters of form. They did sincerely appreciate all that had been done for them. Things had been stirred up a little by sending Mr. Brown to South Africa; and there was no doubt he rendered excellent service. He (Mr. Whiteley) also commended the way in which the Directors had dealt with the funds derived from the improved position.

Mr. W. RICHARDS seconded the motion, which was heartily carried.

The CHAIRMAN, on behalf of the Board, and Mr. E. M. STERLEY, on behalf of the South African staff, acknowledged the resolution.

The Gas Committee of the Skipton Urban District Council report that during the past year the gas-works have yielded a profit of more than £1093, compared with £1016 in the previous year.

## HYGIENIC ADVANTAGES OF GAS-FIRES.

At the close of the business at the annual meeting of the Manchester and Salford Sanitary Association on Monday last week, Mr. WILLIAM THOMSON gave an address on "Gas-Fires: Their Proper Construction, Economic Use, and Hygienic Advantages." Being a chemist, the lecturer treated the subject more from his own than from an engineer's point of view.

Having corrected certain popular errors in regard to the subject, Mr. Thomson expressed surprise at the smallness of the advance made in the improvement of gas appliances for heating purposes during the last twenty-five years. A quarter-of-a-century ago, he said, he was one of the judges of the Stockport exhibition of gas appliances, and then gave much attention to the testing of gas-fires. Having this address to prepare, he went to the Corporation's offices in Deansgate to inspect the present-day appliances for heating by means of gas, and he was surprised to find that greater progress had not been made in their construction. Only one type of fire was shown at these rooms, and they were all closed in by a canopy of sheet iron, and were generally intended to be put in front of the fire-grate, with the tube from the stove passing through a hole in the sheet iron into the chimney. The Manchester gas, Mr. Thomson said, is rather heavily charged with sulphur—containing about 60 grains per 100 cubic feet, equivalent to about 1 oz. of sulphur for every 730 cubic feet burnt. He thought that if this style of fire was to be continued in use, the opening from the back and area of the pipe leading it into the open air must be largely increased.

The lecturer described his experiments with various kinds of gas-stoves, and said the fire he preferred was one which was placed into the space occupied by the coal-fire immediately under the chimney. This fire, when burning about 21 cubic feet of gas per hour at the present price of Manchester gas, cost ½d., and gave about three times the amount of heat into the room that was given by an ordinary coal-fire. He ascertained in burning coal that it required about 7 lbs. of coal, which would cost ¾d. at the rate of £1 per ton, together with some resin wood, which would cost another ¼d., to make a coal-fire in his grate. For half-an-hour after the wood was lighted, there was little or no heat given to the room; while with a gas-fire the heat was rapidly radiated into the room within a few minutes after the gas was lighted. He found in one of his experiments that 6·2 units of heat were radiated into the room from the coal-fire; while 31½ units were radiated from a gas-fire in the same time. During the second quarter of an hour, 5·3 units came from a coal-fire; during the third quarter, 13 units; and during the fourth quarter, 14 units. During the first hour of burning of a coal-fire, therefore, 38½ units of heat were radiated into the room, against 126 units from the gas-fire burning a halfpennyworth of gas per hour. In other words, the gas-fire gave between three and four times more heat than the coal-fire during the first hour.

### A PLEA FOR CHEAPER GAS.

Mr. Thomson said he thought it was exceedingly important that the Corporation should reduce the price of gas to 1s. per 1000 cubic feet; and if the difference were made up by adding the loss to the rates—if there were loss—he could not see what objection there was to doing so. Assuming that a householder's expenditure amounted to £20 per annum for coal, gas, and rates combined, he did not see what difference it should make to the ratepayer if he paid £10 for coal and gas and £10 for rates, or £8 for coal and gas and £12 for rates. If, however, gas were sold at about its cost price, the heating of rooms would become better and cheaper than heating by means of coal, and a great saving would then be effected by doing away with the labour required in carrying the coal to different rooms and removing the ashes after, and the extra dusting and cleaning where coal was used. A still greater advantage would be derived from the fact that the burning of gas in houses and offices would keep the air of the town bright and pure, and would prevent the enormous injury to decorations and the cost of washing and cleaning which the present barbarous method of burning raw coal entails.

The lecturer said he looked over Manchester on the previous Sunday, and the whole of the town appeared like a Continental town, free from fog; but on Monday morning it was deluged with fog. Was it not possible for the Corporation to arrange to sell gas so that it might be more cheaply used than coal, and thus avoid all this dirt and fog?

### A PURER ATMOSPHERE FOR MANCHESTER.

At the close of the lecture,

The LORD MAYOR, who presided, said, in regard to the suggestion of selling gas at 1s. per 1000 cubic feet, he was afraid it would not take on; but certainly full attention must be given to what had been said. He did not know any places that were supplying gas at 1s. per 1000 cubic feet; but if there were any, their circumstances must be very exceptional. The tendency was for coal to become dearer; and the dearer the coal the dearer the gas.

Mr. WILL MELLAND, in moving a vote of thanks to Mr. Thomson, said he had long thought that the extended use of gas was the most likely remedy for the smoke-polluted atmosphere of Manchester. He gave examples of the damge done to property by polluted air, and expressed his pleasure that Mr. Thomson had consented to be a member of the Joint Committee who were charged with the task of devising means for securing a purer air for the city.

The motion was carried with applause.

In acknowledging a vote of thanks passed to himself, the LORD MAYOR said one must not expect, in industrial Manchester—the "hub of the universe" industrially—to keep the same air as on the top of Snowdon. But one could do great things; and he believed people were going in the right direction in using gas instead of coal for fires, and that in course of time it would be found more economical to employ gas in this way than coal.

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In a letter to the "Manchester Guardian" next day, Mr. J. G. Newbigging, the Chief Engineer of the Gas Department, said: "In the course of his address on 'Gas-Fires' at the meeting of the Manchester and Salford Sanitary Association, Mr. William Thomson stated that the amount of sulphur in Manchester gas was equal to 60 grains per 100 cubic feet. This is altogether erroneous; the average quantity for the year ended March last being 39·53 grains per 100 cubic feet. Loose statements of this kind, coming from a man in Mr. Thomson's position, are to be deprecated. His whole address was open to criticism; and I regret that the opportunity was not given to members of the audience to ask Mr. Thomson questions, as it had been indicated would be done."

## MOTOR SPIRIT FROM COAL GAS.

### Criticism of Mr. Doherty's Proposal.

It will doubtless be remembered that the "JOURNAL" for May 20 contained a report of the proceedings at a dinner given at the Savoy Hotel by Lord Montagu of Beaulieu, to afford Mr. Henry L. Doherty, of New York, an opportunity of explaining his proposal for increasing the production of benzol by taking it out of coal gas. Among those present on the occasion were the Chairman of the Gas Committee of the Manchester Corporation (Councillor William Kay) and the Chief Gas Engineer (Mr. J. G. Newbigging, M.Inst.C.E.). Mr. Kay, in the course of his remarks, said Manchester was peculiarly situated in regard to Mr. Doherty's proposal, as it need not go to Parliament for authority to adopt it. At the same time, it would keep an open mind on the subject. The proposal has been criticized by Dr. W. R. Ormandy in a letter in last Wednesday's "Manchester Guardian," from which the following are extracts.

### THE PROPOSAL.

Mr. Doherty proposes that the benzol, which contributes valuably to illumination, should be washed out of the coal gas, and that the public should be supplied with a gas which has no longer in itself any appreciable illuminating power. From the scientific standpoint, there is no doubt that it is utterly wrong to use a valuable product like benzol merely to serve as a fuel when vastly cheaper materials, which are equally efficient in the bulk of cases, are available. Unfortunately for Mr. Doherty's proposal, we must regard modern gas-works as industrial concerns, and not merely as scientific problems. The representatives of the Manchester Corporation pointed out that in their opinion the percentage of gas consumed in the simple old-fashioned burners was probably much nearer 20 per cent. in the Manchester area than the 5 per cent. given by Mr. Doherty. Under the modern conditions of manufacture of coal gas, it is probable that the benzol contents are not over 2 gallons per ton of coal carbonized, or let us say 2 gallons of benzol per 10,000 cubic feet of gas. Mr. Doherty admitted that it would cost 1s. to wash out the benzol from 10,000 cubic feet of gas. In other words, the recovery of about 2 gallons of benzol would cost 1s.; and, assuming a sale price of the finished product of 1s. 2d. per gallon at the works, we have a credit of 1s. 4d. per ton of coal dealt with. If the removal of these volatile hydrocarbon liquids left the gas as valuable as before, except with regard to its inherent illuminating power, the problem would be simple. But the fact is that unless adjustments were made in some other way the public would be getting about 6 per cent. less heat value in their fuel than previously; and instead of burning 10,000 cubic feet to do a certain amount of cooking or lighting with mantles, they would require an extra 600 cubic feet, and they would also want this extra quantity without extra charge. Assuming coal gas at 2s. 1d. per 1000 cubic feet, this 600 cubic feet is equivalent to 1s. 3d.

### THE POSITION OF THE PUBLIC.

Supposing, then, that the method of manufacture of gas be carried on as hitherto, and that the benzene bodies are washed out at the gas-works, and that the public get an allowance in price reduction equivalent to a reduction in heating value, we are faced with this position: The public get a gas which they can no longer use for illuminating purposes without a mantle, and in heat value they are getting just change for a shilling, while the Corporation are adding to their plant and responsibilities without making any profit whatever—all in order that a fuel may be produced for use in motor-engines at a somewhat lower price than that at which it can be obtained at present from other sources. Unless there are some other factors which have not been taken into account, and which seriously affect these calculations, the scheme does not seem very appealing.

Of course, in view of the growing requirements for gas for purposes where heat alone is needed, there is little doubt that before long it will be necessary to attach more importance to the heat value than to the lighting power of our public gas supplies. It is hardly likely that the Government will allow the existing gas companies to work without any restrictions; but granted that the candle-power standard is removed, and a heating-value standard is imposed in its place, then our gas-works managers will have to face a new situation. Still, the capital which is sunk in existing gas schemes is so enormous that any sudden alteration of policy is most unlikely. The function of a gas-works will remain that of turning out the largest possible quantity of heat units from each ton of coal, with whatever requirements of heat contents per volume may be imposed.

### LOW-TEMPERATURE DISTILLATION AND FUEL PRODUCTION.

It is also true that the production of a coalite-like fuel is raising ever-increased attention; and this also is a matter which would have to be considered in future developments. For a long time to come, however, the main policy of the public gas-works will remain gas first, with bye-products—as their name implies—a secondary consideration. In the production of coalite fuels the fuel and bye-products will be the chief consideration; the gas the secondary consideration. Undoubtedly the proper place for coalite fuel production (using the word "coalite" to typify cokes containing some residual amount of volatile matters, and igniting at a low temperature) is in the immediate vicinity of the coal pit. As all the ash of the coal is left in the coke, it is

probable washed fuel will be employed, and, indeed, if use is to be made of many of the low grades of fuel and "smalls," such washing will be necessary to yield a satisfactory product. The manufacture of such fuels necessitates low-temperature distillation, which yields a comparatively small volume of gas very rich in volatile liquid constituents. After the removal of these valuable liquids, the gas remaining would be used, in so far as was necessary, for retort-heating, and the excess, where circumstances permitted, for the generation of power for use in the colliery or in the immediate vicinity.

It is obvious that the solid fuel and the liquid products must together make the scheme profitable, because there is no outlet of sufficient size for town gas in view of the way in which the country is already divided up and monopolies granted. Neither can a combined scheme for utilizing the gas for power generation for public power supply have much chance of success, because less expensive types of plant, such as the Mond gas producer, are preferable for power production. In these plants, comparatively low-grade fuel is burnt under the best possible conditions to return a maximum yield of sulphate of ammonia per ton of coal used and a maximum number of heat units in the gas per ton of coal consumed; the gas, however, being of comparatively low heat value per cubic foot, and hence quite unsuited to compete with town gas for the purposes for which this gas is chiefly employed.

### The Treatment of Our Coal Supply.

It would appear, then, that the treatment of our coal supply resolves itself into three quite distinct businesses:

1.—The production of town gas of standard heating value.
2.—The distillation of coal under such conditions as yield the maximum average value for the coke and liquid portions of the distillate.
3.—The gasification of the coal where the maximum value in heat units is required in the resulting gas (independent, within limits, of thermal value per cubic foot), with a maximum yield of ammonia, which alone of the bye-products receives consideration.

Another of Mr. Doherty's suggestions—that the motorist should use compressed coal gas—is surely intended as a joke. Three hundred cubic feet of town's gas are about equivalent to a gallon of benzol in heat units; and at a pressure of one ton to the square inch, 300 cubic feet of gas would require a steel reservoir outside the power of an ordinary man to handle, and weighing more than the total fuel supply with its containing vessels as carried on an ordinary motor car.

### Petrol Substitutes Joint Committee.

At a meeting of the above Committee held on Monday last week at the offices of the Society of Motor Manufacturers and Traders, Maxwell House, Arundel Street, Strand, W.C., interest centred upon Mr. Doherty's suggestion to recover benzol from town gas. In the discussion which followed at the recent dinner at the Savoy Hotel, Mr. Shrapnell Smith, on behalf of the Committee, invited Mr. Doherty to place fuller details of his proposals before them. Mr. Doherty was accordingly good enough to attend the meeting by special invitation, and the details of his scheme were submitted to long and minute consideration. The Chairman expressed the Committee's cordial thanks to Mr. Doherty, and assured him that no effort should be spared to investigate the problem from all points of view. Mr. Doherty returned to America last Wednesday; but he will be kept informed of the progress made from time to time. The Committee also dealt with a very long *agenda*, comprising a number of alternative schemes for home-produced fuel, particulars of which will be reported in due course.

## STREET LIGHTING IN NEW YORK CITY.

In an address to the New York Section of the American Illuminating Engineering Society, Mr. C. F. Lacombe, the Chief Engineer of Gas, Electricity, and Water Supply of New York, furnished some interesting particulars in regard to the public lighting of the city; and the following are taken from a report in the "American Gaslight Journal."

In New York to-day, arc lamps are used on alternating and direct current and multiple and series systems; the incandescent lamp is used in various sizes in carbon, metallized, and metallic filament types. Gas-mantle lamps are employed, both with upright and inverted mantles, increasing the number of mantles where higher intensities of illumination are desired. Naphtha vapour lamps are in use in some parts of the city where neither gas nor electric service is available. In Manhattan, where the greatest congestion exists, they are now trying the long-burning carbon flame arc lamps, and have installed a limited number of them. Gas supply for mantle lighting is available throughout the greater city, except in a few remote sections. In Greater New York there are now used: 19,180 enclosed carbon arc lamps, 17,991 incandescent electric lamps, 78 flame arc lamps (permanent and on trial), 44,653 single upright-mantle gas-lamps, 28 inverted-mantle gas-lamps (on trial), and 1816 single upright-mantle naphtha vapour lamps—a total of 83,746 of all types. They are furnished by 28 companies, and are used in the following manner: Enclosed carbon arc lamps, reinforced by flame arc lamps, at points of great congestion; enclosed carbon arc lamps on main avenues and business streets, practically over the whole length of these streets in Manhattan, and as far as necessary in other boroughs—using the tungsten incandescent electric and gas-mantle lamps towards the ends of the streets. Gas-mantle lamps are generally employed in the residence districts, and on streets on which there is little night traffic.

Ten years ago, when Mr. Lacombe first took up the work of this department, the illumination of Manhattan and the Bronx was inadequate, unsymmetrical, and out-of-date. The arc lamps on the main avenues were insufficient, were often spaced too far apart, and were not symmetrical either in alignment or in height. Gas flame arc lamps were in the majority, with gas-mantle and electric arc lamps often mixed with them. As soon as a plan of lighting had been developed, all gas-flame lamps were discontinued. The numbers of arc lamps in streets and avenue intersections were practically doubled, and were arranged as symmetrically as practicable, so that the illumination was the best possible the funds allowed. Gas-mantle lamps were placed on the existing posts on all residence streets where arc lamps had not been installed. This system proved to be efficient, and improvements since that date have been made along the same lines, resulting in a system of light sources in long, straight, parallel lines. Mixed lighting has either been done away with, or is now in process of removal; and in the last ten years the illumination in Greater New York has increased 118 per cent. This change has been so gradual that few in the city realize the improvement, though the plan has been successively approved by the Commissioners of four Administrations of the City Government. Mr. Lacombe believes that if the city were thrown back in a day to the lighting of ten years ago, the contrast would be so great as to cause a riot.

New lighting problems are worked out mathematically and geometrically along the lines of proper illumination design. The entire plan is worked out on paper, then a temporary equipment is erected, and the actual results noted in the trial installation, and checked by photometric measurements on the street. All the various reflecting and diffusing devices and lamps that come on the market are thoroughly tried, and when new equipment is adopted it is only after the fullest and most complete engineering analysis. Considerable attention is paid to the design of lamp-posts; and full-size plaster models are made and revised. Patterns are developed and corrected until a satisfactory and harmonious result is attained. In this way artistic effects can be best combined with good construction. The posts are then submitted to the Art Commission, whose criticisms are embodied in the final result. With few exceptions, the arc lighting posts and fixtures are the property of the companies, whereas all the gas lamp-posts belong to the city, as do the tungsten posts in the streets and parks on underground service. The lanterns and lamps are the property of the various companies.

## PUBLIC LIGHTING ARRANGEMENTS AT NOTTINGHAM.

The annual report of the Lighting Committee, presented at yesterday's meeting of the Nottingham City Council, indicated that experiments are still being carried out with automatic lighting and extinguishing apparatus, which continues to act very efficiently. The apparatus is now attached to 486 lamps; there being in all 5632 lamps under the control of the Department. Though the report does not make any reference to the matter, it may be added that considerable improvements effected of late by the introduction at some prominent points—notably opposite the Guildhall—of a new type of lamp for street-lighting purposes in Nottingham has given great satisfaction, and the development of the system is eagerly looked for. Hitherto a large proportion of the old lamps in use in many parts of the city have only served to make "darkness visible." It is a common experience to hear from many visitors to Nottingham from distant places, and particularly those from Continental centres, expressions of astonishment at the poor lighting of the streets—the illumination of some of the main thoroughfares at night being quite unworthy of the city. The matter, however, is not one for which the present managerial *régime* can be blamed. The fault is of very old standing. The Lighting Committee were criticized years ago by Alderman Sir John Turney for being among the last of the municipal committees in important provincial centres to adopt incandescent burners for public lighting purposes; and present developments mark a further welcome, if somewhat belated, advance.

## TOTTENHAM GAS COMPANY AND ELECTRIC LIGHTING.

### Opposition to the Bill Narrowed Down.

At the Meeting of the Wood Green Urban District Council last Wednesday, the Clerk (Mr. W. P. Harding) stated that at the previous meeting he reported that, as the result of a two days' inquiry held by the Board of Trade into the application of the North Metropolitan Power Distribution Company for a Provisional Order to enable the Company to supply electrical energy for lighting purposes within the urban district of Wood Green, the Board decided, after hearing all parties, not to proceed further with the application. On the 1st of May, the Court of Referees of the House of Commons sat to hear the application of the North Metropolitan Electric Power Supply Company, to allow them *locus standi* to oppose the Bill of the Gas Company; and, without calling upon Counsel for the promoters, the Court decided that the Supply Company were not entitled to be heard in opposition to the Bill. The petition of the Tottenham Urban District Council against this portion of the Bill was withdrawn on the 8th of May. Several hundreds of notices had been served upon owners, lessees, and occupiers of all dwelling-houses within 300 yards of the land in or upon which the generating station of the Gas Company might be constructed; and the only objection offered to the site was that of the Printers' Pension Corporation, in respect of their almshouses at Wood Green. In the event of this opposition not being withdrawn, he asked the authority of the Council to give evidence in support of the Bill and of the site before the Committee to whom the Bill had been referred. He added, for the information of the Council, that it would be open to the Power Supply Company to apply to the Committee of the House of Lords for *locus;* but, in view of the facts that the Board of Trade had refused to grant them a Provisional Order and that the Court of Referees had disallowed the Company's *locus*, there was very little chance of any Committee of the House of Lords granting *locus* at this stage.

The Directors of the Continental Union Gas Company, Limited, have resolved to pay, on the 4th prox., an interim dividend of 2¼ per cent. on the ordinary stock, together with the half-yearly dividend of 3½ per cent. on the preference stock, in both cases less income-tax.

## BIRMINGHAM WATER SUPPLY.

### Effect of Welsh Water on Hot-Water Pipes.

The "Birmingham Daily Mail" recently contained the following remarks on the effect of the Birmingham water upon pipes.

The Welsh water which Birmingham now enjoys possesses many advantages, and the supply accorded to the city is in many respects one of the finest in the world. But it also has its disadvantages and drawbacks, which householders are now finding out to their cost. Experience has proved that the Welsh water leaves a far heavier deposit of "fur" in the pipes—particularly the circulating pipes—than was the case when the old water supply was in operation; and the action of the water on the ordinary iron pipes is very marked.

From time immemorial there has, of course, always been trouble with the fur deposited on the inside of water-pipes; but the case has never been so serious as it is to-day, according to a statement made by a plumber of considerable repute in Birmingham. It would seem as if the authorities now recognize the effects of Welsh water, because the cisterns to-day have to be made three times as strong as those which were passed by the Municipality under the old *régime*. A danger in the stopping-up through this means of hot-water circulating pipes is that the steam has to go somewhere, and an explosion is not unheard of as the result of such furring of service-pipes. Our informant said his firm had had many inquiries from householders as to the advisability of taking out the galvanized iron hot-water pipes and putting in copper. But in most cases the price has proved prohibitive. With copper pipes all the fittings, &c., would also have to be of the same metal; and as copper is particularly expensive at the present moment, few people will face the cost of an alteration in this direction.

There is, however, a large estate near Birmingham where it has been decided, at very heavy expense, to have the galvanized iron pipes replaced by copper, because of the ill-effects of the water on the present pipes. The copper resists the action of the Welsh water much better than does the galvanized iron pipe. There is a case on record where ¾-inch galvanized iron pipes were laid in, and they have now become so clogged after 2½ years' service that a match would hardly pass through. Householders who find it difficult to get a good supply of hot bath water even when a substantial fire is prepared, will probably find this cause the explanation of most of their difficulty.

## MANCHESTER CORPORATION WATER SUPPLY.

### Water Committee's Annual Report.

At the last Meeting of the Manchester Corporation, the report and accounts of the Water Committee for the year ended March 31 were submitted. The average daily consumption of water during the year was 42,545,337 gallons, of which 24,046,013 gallons were derived from Longdendale and 18,499,324 gallons from Thirlmere. The construction of the works connected with the third line of pipes from Thirlmere is now approaching completion. The work is distributed over 31 syphons across the various valleys on the line of aqueduct, and the aggregate length amounts to about 54 miles. The work of afforestation at Thirlmere is proceeding in a satisfactory manner. About 100 acres have been planted during the year, and all the new plantations are making good progress. The hydraulic power supply is becoming increasingly appreciated, and the normal pressure was given continuously. During the year, 372,051,300 gallons of power water were pumped into the hydraulic mains—an increase of 35,937,900 gallons, about 11 per cent. in excess of the amount pumped in the preceding year. The year's receipts from water-rates, rentals, and metered supplies amounted to £427,091; about two-thirds of the revenue being for supplies within, and one-third for those beyond, the city. Other sources amounted to about £13,286. The total payments came to £502,510. The hydraulic pressure supply alone brought in a revenue of no less than £35,162. The outstanding debt on the undertaking is about £6,400,000.

## LAYING WATER-PIPES IN CHATSWORTH PARK.

### Claim for Compensation by the Duke of Devonshire.

At the Surveyors' Institution on the 20th ult., proceedings were opened in an arbitration on a claim for £43,000, made by the Duke of Devonshire against the Derwent Valley Water Board, in respect of easements through Chatsworth Park for laying pipes to convey water for the supply of Sheffield, Derby, Nottingham, and Leicester.

The Arbitrators were: For the Duke of Devonshire, Mr. J. FARRER; for the Water Board, Mr. J. GERMAN. The Umpire was Mr. C. A. RUSSELL, K.C.

Mr. BALFOUR BROWNE, K.C., and Mr. C. C. HUTCHINSON appeared for the claimant; Sir A. CRIPPS, K.C., Mr. E. HONORATUS LLOYD, K.C., and Mr. GIBBONS represented the Board.

Mr. BALFOUR BROWNE said the case arose under the Derwent Valley Water Act, 1899, which provided for the supply of water to four great towns. The work began in 1905, so far as the Duke's estate was concerned, when a temporary railway was constructed. The work in connection with the pipe trenches commenced in July of that year and finished in April, 1907. The work actually done in Chatsworth Park—and this was the most important matter in the arbitration—was begun on Jan. 4, 1906, and finished on the 7th of November of that year. During the whole time the work was being carried out the Duke had been prevented from using Chatsworth House. He claimed for the easement on rights of laying pipes in a strip of land 6400 yards long and 11 yards wide. The Board occupied the entire fee simple of the whole area covered by the pipes for the purposes of construction, and such areas as were necessary during repair, and also during inspection of the underground structures from time to time. The owner was prevented from building on the land or altering the level in any way. If the mansion were let on a short lease, it would command a much smaller rent owing to the fact that at any time the Water Board might commence additional work in the park for the purpose of giving further water supplies under the terms of their Act. The extension of the water-works would necessitate further constructional work, beginning on the estate in 1916. During the time this work was going on, and the Duke was prevented from living at Chatsworth, his expenditure would not be limited. He would have to keep up the house, pay seventy gardeners, and have all the expenses connected with the management of the estate, while he would be getting no benefit from it. The up-keep of Chatsworth cost between £17,000 and £18,000 a year.

Mr. *G. H. Hanson*, architect, of Huddersfield, gave evidence as to the character of the work carried on at Chatsworth when the pipes were laid. The uncertainty as to when further constructional work would be done would be an important factor with any prospective buyer or occupier. The fact, too, that there was a dual ownership, and that the second party had the right of entry for the maintenance of the works, was a serious matter for an estate of this kind, where complete control was of the greatest importance. The effect of the work approached the taking of the fee simple. It would be impossible to keep up Chatsworth for less than £12,000 a year, even when the family were not living there. If the house could not be used for a year owing to the work on the easement, the loss of enjoyment of the dwelling should be put down at £12,000.

Mr. *J. T. Wood*, M.Inst.C.E., of Liverpool, said he saw the work complained of when it was in progress in 1905 6. It would be impossible to carry out work of the kind without causing great nuisance to Chatsworth House. Practically the whole of the estate was affected injuriously. There was damage in respect of the easement and injury to the occupier and the estate. His calculation of the damage, which agreed with that of the previous witness, was based on the fact that the work occupied ten months instead of six.

Other evidence having been given in support of the claim,

Mr. BALFOUR BROWNE said it had been stated that the annual cost of the upkeep of Chatsworth was between £17,000 and £18,000, and that £12,000 had been put by his side as the compromise sum. He did not in connection with this matter desire to go into details of expenditure in public, and if the other side would accept £12,000 for the purposes of the arbitration it would not be necessary to call evidence on the point.

Sir A. CRIPPS said he would accept £12,000 as the compromise sum.

This was the case for the Duke.

Mr. *E. Holmes*, Surveyor to the Water Board, stated that in his proof of valuation he had allowed for the second pipe being laid 48 years after 1905 and the third pipe 76 years after. There was no likelihood of the populations in the districts served by the Board increasing.

Sir A. CRIPPS handed to the Umpire his estimate of the amount of compensation which the Board considered was due to the Duke. The total sum was £5801, made up as follows: Easements through the park, £3082; 10 per cent. for compulsory purchase, £308; inconvenience and surface damage, £2411.

In further examination, witness stated that 10s. per lineal yard for the easement through the park and 5s. per yard for the easement through the agricultural land would be fair and reasonable compensation. If Chatsworth House were to be let, the question of the easement would not affect it at all, except during the construction of the works. Instead of damage being done, the estate was improved.

Mr. *S. B. Winser*, M.Inst.C.E., the Engineer to the Water Board, confirmed the evidence of the Surveyor, and said the second instalment of the Derwent scheme would have to be undertaken in 1953, and the third pipe laid in 1981.

Mr. *Holmes*, recalled, stated that in a similar dispute over the Duke of Rutland's property on the north side of the Chatsworth estate, a claim was made for £5961, and the award was £3520. His interpretation of this award was that the payment for easements was 5s. a yard. In another case on the south side, this was also the amount allowed for easements.

Sir A. CRIPPS said the case illustrated the difficulty of valuation when they were dealing with matters which were not ordinary market transactions. The witnesses for the Duke had estimated some of the damage twice over. In addition to the amount for easements, they claimed £10,000 for damage to the estate, which should be eliminated. The further sum of £12,000 for damage caused by the laying of the pipe was excessive. When the tribunal came to deal with the figures, instead of having to differentiate between £40,000 and £6000, it was probable that the difference would be between £15,000 or £16,000 and £6000. He supposed the money involved was no very great matter to the Duke of Devonshire; but he had to be compensated properly. They had to face the question of the burden placed upon Chatsworth, and of the price that ought to be paid. The Water Board did not wish to run down a fair claim to compensation; but they did not desire that what they considered largely exaggerated figures should be sustained.

Mr. BALFOUR BROWNE submitted that the Duke was entitled to compensation for losing control over the strip of land through which the Board's pipe was laid. The entire control of this part of the property was taken from him. He was entitled also to compensation for injury which resulted to the rest of his land, besides the amount that was paid for easements. They were bound to consider whether a possible purchaser or tenant of Chatsworth would not take all these matters into account. If Chatsworth House were in the market, it would be decreased in value by the work.

The UMPIRE said his award would be given at an early date.

**Newhaven and Seaford Water Company.**—At the half-yearly general meeting of this Company last Thursday, the Directors reported that the amount available for distribution was £1412, and that they had decided to declare an interim dividend. They therefore recommended the payment of 2½ per cent. on the "A" capital, and 1¾ per cent. on the "B" capital, all free of income-tax. These payments would absorb £935, and leave £477 in hand. The report was adopted.

## THE WATER-WORKS SCHEME FOR CUMBERLAND.

The completion of a water-supply scheme for Cumberland, at a cost of £10,000, was signalized last Thursday by the opening of a new filter-house and reservoir at Quarry Hill, near Mealsgate, in connection with the Aspatria, Silloth, and District Joint Water Board's project, under which practically the whole area of North-West Cumberland is now supplied with water for domestic purposes. The latest developments bring up to £68,000 the total capital expenditure upon this comprehensive scheme, since its inception twelve years ago. Under the scheme, the head waters of the River Allen are gathered in a large open reservoir above Uldale—in the hills behind Skiddaw—and conveyed by gravitation to Aspatria and on to the coast town of Silloth, supplying the villages on the way. The venture—maintained out of the public rates—is becoming one of the most important water undertakings in the north-western county. A population of about 10,000 is catered for; and the average daily consumption is 428,000 gallons. There are upwards of 20 miles of trunk and branch mains within the Board's jurisdiction, and, in addition, nine parishes are supplied in the Cockermouth and Wigton rural districts. Further important developments are contemplated. The purity of the water was unquestioned; but the £10,000 scheme (to which the Local Government Board gave their sanction) was decided upon to obviate the occasional discoloration of the water by harmless vegetable matter. Mr. Joseph Graham, of Carlisle, was the Engineer; Messrs. Bushby and Sons, of Leeds, the Contractors for the reservoir; and Mr. J. Routledge, of Mealsgate, the Contractor for the filter-house and pipe-line. Mr. H. Howard, Chairman of the Cumberland County Council, was to have performed the opening ceremony, but was prevented from attending; and the water was turned on by Mr. W. Williamson, the Chairman of the Wigton Rural District Council, who was the Water Board's first Chairman.

**Electrical Undertakings and Rate-Relief.**—In the course of a Local Government Board inquiry at Birkenhead into an application by the Corporation to borrow money for the electricity undertaking, the Inspector (Mr. H. R. Hooper) expressed a strong opinion with regard to municipal electrical undertakings paying money towards the relief of the rates, instead of building-up an adequate reserve fund, and remarked that no municipal authority could afford to pay a penny to the relief of rates in view of the present position of the electrical industry, which was increasing by leaps and bounds. It was necessary to make provision for a sufficient reserve fund with which to purchase the larger and more up-to-date generating plant needed to meet the ever-increasing demand. Mr. Clarke (Chairman of the Electricity Committee) agreed that, as the consumption of electricity in Birkenhead was increasing, it was necessary that they should look to future needs, and provide sufficient plant, rather than contribute to the present needs of the rates.

## NOTES FROM SCOTLAND.

**From Our Own Correspondents.**

*Saturday.*

**Edinburgh.**—At a meeting of the Edinburgh and Leith Corporations Gas Commissioners on Monday last, there was submitted a statement by the Engineer and Manager (Mr. Alexander Masterton) with regard to district cookery demonstrations and gas exhibitions. A series of these throughout Edinburgh and Leith has just been concluded; and Mr. Masterton reported that the lectures were all much appreciated by the public and attended by large audiences. They had received a great number of inquiries; and orders for cookers and other gas apparatus were coming in by every post, so that the popularity of these appliances was still steadily extending. He thought the time had now arrived when the Commissioners should consider the advisability of employing on the staff a lady demonstrator. Bailie Lindsay, the Convener of the Works Committee, said Mr. Masterton was particularly anxious that the matter should be hastened; and, on his motion, a remit was made to the Works Committee, with power to see the matter carried through.

The question of alleged pollution of a brewery well has now been settled by the payment by the Commissioners of a sum of £2000—the cost of sinking a new bore in a place where satisfactory water had been found. The deeds for the sale of the Corstorphine Gas-Works have been signed and sealed. The Sub-Committee appointed in March to consider and report on evidence to be led by Bailie Pennell in support of his charge against the foremen and workmen at the Granton Gas-Works have submitted a report that, "after examination of the parties named by Bailie Pennell as able to throw light on the points, and after interrogating several other parties, the Sub-Committee were of opinion that not one of the charges had been substantiated, and that the Commissioners should accordingly hold the foremen and workmen as completely exonerated." By 17 votes to 2, the Commissioners approved the Sub-Committee's report. Mr. Herring has reported upon the manufacture of sulphuric acid at Granton, which he considers could be done at a cost of 23s. per ton, as compared with 27s. 6d. asked by contractors. He suggested a plant double the size at present required, and that the surplus acid should be sold in the open market. Such a plant, he considers, would cost £10,000. The Committee have contracted for 200,000 tons of coal for the coming year from July 15.

**Glasgow.**—It is a pleasure to record that the salary of Mr. Langlands, Inspector of Lighting, has been increased by £50. A curious position has been brought to notice regarding three officials of the Gas Department—namely, Messrs. James Fleming, William Rait, and John A. Burns—who appear to have been connected with one or other of the two private Gas Companies which were acquired by the Corporation in 1869, when the income-tax upon their salaries was paid by the Companies, and the Corporation, as part of the bargain, agreed to


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fitted with our Patent Thermostat, not a foot of gas is used beyond what is actually needed. The Thermostat controls the gas supply better than the greatest human care can do, and it cannot get out of order.

***This makes the heating of water for domestic services a success.***

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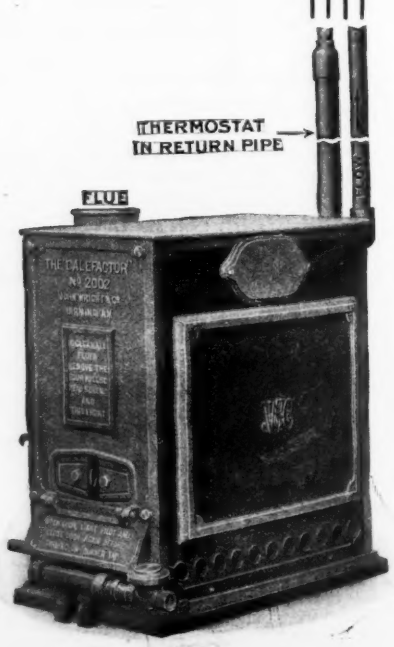

continue the payment of the tax. The Town Clerk, in reply to a question, said it was only on Wednesday last that he had ascertained the fact, and he proposed to make further inquiries. These officials appear to be the only surviving employees of the old Companies.

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**Aberdeen.**—At a meeting of the Gas Committee of the Town Council on Wednesday, it was agreed to lay an extension of the gas-main to Kincorth Road, and contracts, spread over a number of firms, for the supply of 90,000 tons of coal were accepted. Messrs. Clayton, Sons, and Co., Limited, of Leeds, received the order for the steel pipes needed in connection with the vertical retort installation, and Messrs. Stewarts and Lloyds, of Glasgow, for the cast-iron pipes.

**Bathgate.**—A serious explosion, resulting in the death of one of the workmen, Martin Murphy, has occurred at the gas-works. The works foreman, Peter Burns, though he was thrown a considerable distance, escaped with only slight injury. The explosion occurred during the dismantling of an old gasholder. For the purpose of allowing the gas and air, which were believed to be in the holder, to escape, a hole was to be made in the side. Murphy commenced to use a heavy pickaxe, and every precaution was taken to prevent sparks; but these seemed to have failed, and it is expected that the explosion was caused by a spark igniting the mixture. The explosion has completely wrecked the holder, and done considerable damage to the masonry work of the tank; but the working plant has been undamaged. Murphy's death was caused by shock, as there were no marks about him whatever.

**Bo'ness.**—The Gas Company are laying an enlarged main for the purpose of augmenting the supply to the higher districts of the town, and to Castleloan.

**Broughty Ferry.**—A number of meetings of ratepayers are being held to object to the appeal, about to be made by the Town Council to the House of Lords, against the decision of the House of Commons Committee to make Broughty Ferry part of Dundee, and to take over the gas-works. It is thought that, by entering into negotiations, a friendly settlement might be come to by which better terms can be secured to the smaller burgh.

**Buckhaven.**—At a special meeting of the Town Council on Monday, it was agreed, on the motion of Bailie Taylor, to adopt the Burghs (Scotland) Gas Supply Act. Bailie Taylor stated that the Committee had been at work on this question for the past year, and considerable inquiry had been involved. This had been greatly facilitated through the courtesy of the Leven and Wemyss Companies, and also through the able guidance of Mr. Henry O'Connor. Mr. Smart stated that wherever municipal gas had been introduced it had immediately been followed by a reduction in price.

**Cambuslang.**—At a meeting of the District Committee for the Middle Ward of Lanarkshire, the special lighting district of Cambuslang was enlarged to include the Newton and Flemington drainage district. For such lighting purposes, a rate of 3½d. in the pound is to be imposed.

**Dunbar.**—A resolution from the ratepayers has been presented to the Town Council, asking that a plebiscite of the ratepayers should be taken before anything further is done regarding the water scheme. It was decided to defer dealing with the plebiscite until next month. The scheme proposed is to cost at the least £22,480.

**Dundee.**—The statement of accounts of the Gas Commissioners for the year to April 30 is an excellent one. The revenue for gas shows an increase of nearly £6000, and the gross revenue, including bye-products, about £15,000 over the previous year. Gas manufacture cost £16,000 more than the previous year; so that the total cost is £16,000 up, of which coals alone account for £15,000. After full deductions for depreciation, interest, and sinking fund, there is a net profit of £2600 to be carried to next year's account. The total gas made was close upon 1000 million cubic feet, costing 1s. 4·73d. per 1000 cubic feet. There are 25,000 cooking appliances on loan, and 8848 gas fires and radiators in use, of which 5000 have been installed during the past two years. It is estimated that the cost of gas for the coming year will be 1s. 6·41d. per 1000 cubic feet, owing to the increase in the cost of materials.

**Greenock.**—The Gas Committee have been empowered by the Corporation, at a special meeting, to erect show-rooms and dwelling-houses, at a cost of £3280, at 30, West Blackhall Street. After discussion, the motion was approved by a large majority.

**Stonehaven.**—The first annual meeting of the Stonehaven Gas Company was held on Tuesday, when Mr. George Gregor, the Chairman of the Company, in submitting the Directors' report, said that the registration of the Company had been satisfactorily carried through. Last year the gas consumption amounted to over 22 million cubic feet. The profits of the year, as shown by the report, after deducting £251 6s. 5d. for depreciation of plant, were £870 6s. 10d. The Directors propose to add to the reserve fund £336 3s. 7d., and to pay a dividend of 5 per cent., which would absorb £505, leaving £29 5s. 3d. to to be carried forward. These proposals were unanimously adopted.

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**Tottenham Public Lighting.**—At the meeting of the Tottenham Urban District Council last Tuesday, the report of the Engineer on the subject of the tenders which had been received for the public lighting of the district, noticed in the "JOURNAL" last week (p. 611), was under consideration. It may be remembered that the General Purposes Committee of the Council recommended the acceptance of the tender of the Tottenham Gas Company for a period of ten years, subject to the execution of an agreement, to be prepared by the Council's Solicitor and submitted for approval, and subject to provisos that if the price of gas to ordinary consumers is reduced to 1s. 9d. per 1000 cubic feet in five or seven years, or if any substantial change takes place in the method of public lighting, the Council may terminate the agreement with a view to making other arrangements. On the motion to adopt the recommendation, an amendment was proposed that the contract should be for five years, as this would coincide with the period when the contract with the Electric Light Company would expire. But the amendment secured only two votes; and the motion was carried.

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## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 31.

**Sulphate of Ammonia.**

During the past week the market for this article has shown few signs of animation so far as early delivery is concerned, buyers generally having continued somewhat apathetic. There has, however, been no quotable change in prices, and the nearest values at the close still are £12 18s. 9d. per ton f.o.b. Hull, £13 per ton f.o.b. Liverpool, and £13 1s. 3d. per ton f.o.b. Leith. In the forward position there has been a better demand, and it is reported by manufacturers that £13 5s. per ton has been paid by dealers for July-December this year, and £13 7s. 6d. per ton for January-June, 1914, f.o.b. at the principal ports, in equal monthly quantities.

**Nitrate of Soda.**

This market is again rather easier, and spot quotations have been reduced to 11s. per cwt. for ordinary and 11s. 1½d. for refined quality.

LONDON, *June* 2.

**Tar Products.**

There has again been experienced a quiet week in the market for tar products; and there has been a slight reduction in the prices of one or two articles. In regard to pitch, it is difficult to transact business; and there has again been a slight fall in the price. Benzols remain firm; and the inquiry is good for both near and forward delivery. There has been a decided weakening in the value of solvent naphtha, and fair quantities have been offered for both prompt and delivery to the end of the year at lower figures. Consumers are still unwilling to pay the prices being asked by manufacturers for crude carbolic. Some dealers seem to be in a position to pay almost 1d. per gallon more than consumers. Creosote is fairly firm in London; but Midland and Northern makes are apparently offering at slightly lower prices.

The average values during the week were: Tar, 26s. 6d. to 30s. 6d. Pitch, London, 44s. to 44s. 6d.; east coast, 43s. 6d. to 44s.; west coast, Manchester, 42s. 6d. to 43s. 6d.; Liverpool, 43s. 6d. to 44s.; Clyde, 43s. 6d. to 44s. 6d. Benzol, 90 per cent., naked, London, 1s. 0½d. to 1s. 1d.; North, 1s. to 1s. 0½d.; 50-90 per cent., naked, London, 10d. to 10½d.; North, 10d. Toluol, naked, London, 11d. to 11½d.; North, 10⅞d. to 11d. Crude naphtha, in bulk, London, 5½d. to 5⅝d.; North, 4⅞d. to 5⅛d. Solvent naphtha, naked, London, 11d. to 11½d.; North, 9½d. to 10d. f.o.b. Heavy naphtha, naked, London, 11½d. to 1s. f.o.b.; North, 10d. to 10½d. f.o.b. Creosote, in bulk, London, 3⅛d. to 3¼d.; North, 2⅞d. to 3d. Heavy oils, in bulk, 3½d. to 3⅝d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 4d. to 1s. 5d. Naphthalene, £5 to £9; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

**Sulphate of Ammonia.**

This market is dull, and manufacturers have again had to take lower prices in order to dispose of their prompt parcels. In spite of the heavy fall which was experienced recently, business is being done for the far forward position at even lower than to-day's prices. Actual Beckton make is, it is understood, quoted at £12 16s. 3d. Outside London makes are £12 8s. 9d.; Hull, £12 16s. 3d. to £12 17s. 6d.; Liverpool, £12 17s. 6d. to £12 18s. 9d.; Leith, £12 18s. 9d. to £13; Middlesbrough, £12 17s. 6d.

**Manchester District Tar Prices.**

It is officially announced that the average price realized for April deliveries of tar in the Manchester district—based on the value of the products—was 38s. 11d. per ton.

## COAL TRADE REPORTS.

**Northern Coal Trade.**

There is an irregular tendency in the coal trade, though the demand is fairly good—the forward prices showing more variation. In steam coals, the exports are fully an average. Best Northumbrian steams are from 15s. 3d. to 15s. 7½d. per ton f.o.b.; second-class steams are about 14s.; and steam smalls are weaker at 9s. 6d. to 10s. 6d. There is a tolerably full production, which is well taken up. In the gas coal trade, the consumption is moderate; but there are fair exports. Best Durham gas coals are from 15s. 4d. to 15s. 9d. per ton f.o.b.; and for second class, about 14s. 6d. is now the current quotation. For "Wear specials," the price is near 15s. 9d. per ton. Among the contracts is one for the St. Gilles (Brussels) Gas-Works—about 20,000 tons—which has been placed at 17s. per ton, delivered over a year. The price delivered includes, of course, the freight, which will be rather variously estimated; but there is an inclination to look forward to somewhat lower rates than those that have prevailed during recent months. Other contracts for gas coal are in close treaty; and somewhat near current values is looked for. Gas coke is quieter, though there is a limited summer output, and exports are fair—the actual price being little changed.

**Scotch Coal Trade.**

There are signs throughout the Scotch coal trade that easier prices are impending in the near future. On Friday, on the Glasgow Coal Exchange, the following were the approximate prices quoted: Steam coal, 13s. 3d. to 13s. 9d.; splint, 14s. 9d. to 15s. 3d.; ell, 13s. 6d. to 14s.; trebles and doubles, 12s. 9d. to 13s. 3d.; and singles, 12s. 6d. to 13s. per ton, f.o.b. Glasgow.

At a recent sale by auction, new ordinary shares in the Cleethorpes Gas Company, to the nominal amount of £5000, were put up by Mr. E. Garnay in £100 lots, which realized from £153 to £155 each.

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## West Bromwich Gas Undertaking.

The Gas Committee of the West Bromwich Corporation have just issued their accounts for the financial year ended March 31. They show that the total income was £62,792—an advance of £5210 compared with the previous year. There was an increase of £252 from the sale of gas, and of £4694 from residual products. The total expenditure on the trading account was £49,684, or an increase of £6344. After payment of interest and sinking-fund charges, the net profit was £4824, compared with £5839—a decrease of £1015. The Committee have decided to appropriate £500 in aid of the general district rate, and to carry forward the balance of £4324.

## Smethwick Gas Undertaking.

The Gas Committee of the Smethwick Corporation report that the total quantity of gas sold during the year ended March 31 last was 543,076,000 cubic feet—an increase of 48,823,400 cubic feet, or 9·88 per cent., on the previous year. The increase in the gas-rental was £1572. The Committee have raised the wages of the lamplighters in their employ from 23s. to 25s. per week. They have decided to make the Free Library Committee an allowance of £50 per annum towards the cost of gas lighting and fittings maintenance at the Central Library. The Public Works Committee are endeavouring to arrange with the Gas Committee for the lowering of mains in certain parts of the borough.

**Electric Light Failure at Bexhill.**—A large part of Bexhill was plunged into darkness on the night of the 25th ult. by the failure of the electric light, owing to a breakdown in one of the cables. Several public-houses were illuminated by candles, and presented a weird appearance.

**Scunthorpe and District Gas Supply.**—The Scunthorpe Urban District Council have decided to proceed with their application to the Local Government Board for a Provisional Order to include Ashby within the limits of their gas supply. At a meeting of the Council last Tuesday, the Clerk (Mr. H. M. Hett) said that a communication had been received from the Board, stating that they were willing to grant a Provisional Order providing Scunthorpe was prepared to meet any opposition in Parliament. It was also mentioned that, if opposed, Scunthorpe's Order might cost £2000 more. The importance of the matter is increased because the Frodingham Urban District Council some time ago decided to build gas-works of their own, and apply to Parliament for powers to include Ashby in the limits of their supply. At first, Ashby decided to remain loyal to Scunthorpe; but subsequently, at a private conference, at which a Local Government Board Inspector was present, Ashby created a surprise by announcing that they would throw in their lot with Frodingham. On Monday last week, however, there was another development; for at a special Council meeting Ashby re-affirmed their arrangement with Scunthorpe.

## Prestatyn Gas Supply.

Presenting the annual working statement of the gas undertaking to the Prestatyn Urban District Council on Monday last week, Mr. T. Pennant Williams, the Chairman of the Gas Committee, said the gas made during the year showed an increase of 3,500,000 cubic feet. The make per ton of coal carbonized—viz., 11,523 cubic feet—was also much higher; and he congratulated the Manager (Mr. F. Wilkinson) upon such an excellent result, which compared very favourably with that shown by other gas concerns on the North Wales coast. The price obtained for coke was very satisfactory, having gone up 1s. a ton; and the contract for tar and liquor had been let for this year at the high price of 30s. per ton. During the past year, they had added a great many mains and extensions to their system. Mr. Williams then read a letter received from Mr. E. H. Stevenson, who was engaged by the Council in connection with the parliamentary proceedings incidental to the acquisition of the undertaking, congratulating the Council, the Manager, and his staff upon the good results obtained both in working and financially. Despite the very large amount the Council had to pay for the concern, they were now making a net profit. Mr. Williams added that in the year 1910-11 the net profit was £474; in 1911-12, there was a loss of £173; and in the year lately closed there was another net profit of £98—the clear profit on the three years' working being £389.

**Automatic Lamp Lighters for Belfast.**—Messrs. Alder and Mackay, of Edinburgh, inform us that the City and County Borough of Belfast have decided to instal another 350 of the "A. & M." patent automatic controllers in their street gas-lamps. This brings up to 1100 the total number of "A. & M." controllers supplied to Belfast within the past two years.

**Reduced Prices of Gas and Water at Llandudno.**—At their last meeting, the Llandudno Urban District Council authorized the Gas Committee to reduce the price to a figure commensurate with the available surplus; and 2d. per 1000 cubic feet is regarded as certain. The charges for the supply of water for domestic purposes in the urban district of Llandudno were reduced by 3d. in the pound; and a corresponding reduction was made for water supplied to large establishments, &c., by meter.

**Automatic Public Lighting at Huddersfield.**—At the last quarterly meeting of the Huddersfield Town Council, the minutes presented by the Gas Committee contained a statement that a Sub-Committee had considered the report of the Borough Engineer, referred to the Committee by the Highways Committee, recommending the lighting and extinguishing of the street lamps by clocks placed in the lanterns. The Gas Engineer (Mr. E. A. Harman, M.Inst.C.E.) reported thereon, and discussed the subject with the Committee. It was resolved that the Horstmann system of automatic street lighting should be applied as an experiment, by fixing the apparatus to 75 lamps in the centre of the town. The minutes were passed.


# Richmond's "IRONCLAD" Circulator

Regd. Design

OUR claims for the "IRONCLAD" are *under* rather than *over* estimated, as our winter tests have proved.

They show that our ALL IRON Circulator *can* and *does* give results equal to other heaters.

We are prepared to show our test figures. Many gas undertakings have proved them and definitely decided to Hire out the "IRONCLAD."

Our staff is at your disposal on any water heating proposals which may need expert advice.

THE Richmond GAS STOVE & METER Co LTD

WARRINGTON & LONDON.

**Water-Softening Plant for Broadstairs.**—At the Rumfields Water, Works, Broadstairs, there was inaugurated on Saturday a new water-softening plant; those present including Mr. Norman Craig, K.C.-M.P., Mr. C. S. Reed (the Chairman of the Water Committee), and Mr. Haines (the inventor of the system adopted). The ceremony of starting the machinery was performed by the Chairman of the Council (Rev. C. S. F. Ridgeway, J.P.); and subsequently the company inspected the works.

**Serious Gas Trading Deficit.**—The report of the Auditors of the Newry Urban District Council's Gas Committee on the accounts of the undertaking for the year ended the 31st of March last shows a loss on the year's trading of £776, compared with a profit of £229 in the previous year. There is also a deficiency of no less than 19,924,200 cubic feet between the quantity of gas returned as having been made and the amount sold. It is believed that, as a result of the year's working, it may be necessary to increase the price (now 3s. 9d. per 1000 cubic feet) by several pence.

**Water Supply to Metropolitan Voluntary Hospitals.**—At the meeting of the Metropolitan Water Board last Friday, the Appeal and Assessment Committee called attention to the loss caused by the increasing consumption of water at voluntary hospitals, under the method of charging 5 per cent. on rateable value, as compared with the old system of supplying by meter. The Board lost £9682 in 1912 on the 96 hospitals in their area; and the Committee proposed to ask the hospitals to take precautions to keep the consumption of water within bounds. They also pointed out that hospitals were frequently inserted in local valuation lists at a figure much below their true value. Mr. Musgrave, the Chairman of the Committee, said the Board were practically subscribing £10,000 a year to the hospitals, and yet their employees were sometimes refused admission without the payment of a fee. The report was approved.

**Uckfield Gas Company, Limited.**—At the meeting of this Company last Thursday, the Directors reported a profit of £485 for the past financial year, compared with £863 before; and they recommended the payment of a dividend of 5s. per share for the year. This would absorb £450, and leave £35 to be carried forward. They explained that the revenue from gas-rental amounted to £1703, against £1736 before. The outlay for coals has been £1002, against £860, owing to the increase in the price, which the Directors feared would not be lower in the current year. In July last, they had to make a change in the staff at the works, and they appointed Mr. A. Holmes, formerly of Stoke-on-Trent, as Working Manager, and also engaged a fitter, in order to make a new department for supplying and fixing consumers' fittings. The arrangements made had been quite successful. Unfortunately, the state of the works under the former Manager was found to be unsatisfactory, and this necessitated a larger outlay for repairs. Moreover, the purification of the gas was not up to the usual standard, and the Directors felt bound to make an allowance to the consumers of 10 per cent. on one quarter's rental. The report gave rise to a long discussion; but eventually it was adopted, and the dividend declared.

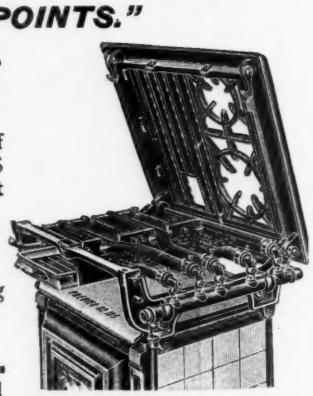
**Burst Water Main in Birmingham.**—On the night of Saturday, the 24th ult., the 24-inch main, conveying the water from the Whitacre reservoirs for the supply of the low-lying parts of the eastern side of Birmingham, burst at Gravelly Hill. There was at once a great outflow of water, and the neighbouring premises were flooded. Traffic was suspended, and the tramway service dislocated. The hole in the pipe was about 6 feet long. Repairs were at once commenced, and by Sunday afternoon the water was turned on again. It is supposed that the fracture was caused by the traffic passing over the spot, which is very heavy at the place where the accident on the present occasion occurred.

**Exeter Water-Works Record Profit.**—The annual report recently submitted by the Water Committee to the Exeter City Council was, as the Chairman (Mr. Stocker) remarked, the most satisfactory ever presented. The income amounted to £16,893, as compared with £16,483 in the previous year. Owing to the abnormally wet season, there was little need to use steam for pumping purposes; and the result was that the expenditure on coal was only £174, as compared with £925 in 1911. The gross credit balance was £11,400; and after paying interest and sinking fund, the net profit was £2356. Out of this sum, it was recommended that £2000 should be appropriated to the credit of the general district rate, and the balance carried to the reserve fund. Mr. Stocker paid a tribute to the efficiency of the staff, and commented on the foresight displayed by their predecessors who acquired the works. He only regretted that they did not at the same time purchase the gas-works, which were offered to them on favourable terms. The Council had been willing to purchase, but the ratepayers did not agree. Mr. Challice said acknowledgment should be made of the valuable services of the Water Superintendent (Mr. A. Kneel), who had the interests of the department at heart.

**Monmouthshire Water Supply.**—We learn from the Engineering Supplement to "The Times" that the Abertillery Water Board are making good progress with their water scheme, which is being carried out at a cost of upwards of £261,000, to supply an estimated population of 90,000 in the western valleys of Monmouthshire. A storage reservoir, which will have a capacity of 376 million gallons, is being constructed in the Grwyne Fawr Valley, in the Black Mountains of Breconshire. The dam will be 146 feet high, 128 feet wide at the base, and 16 feet wide at the top, and will be built with a curve having a radius of 2500 feet. The total length of the pipe track, which is now being laid, is 35 miles. The supply mains at the point where they cross the Usk at Abergavenny have a working pressure of 700 lbs. per square inch, which is probably the highest working pressure in the country for mains to supply water for domestic purposes. The contract for the steel tubes has been placed with the British Mannesmann Tube Company. Service reservoirs are in course of construction at Abertillery, Abercarn, and Nantydraenog, each of which has a capacity of two million gallons. The Engineer is Mr. Baldwin Latham, M.Inst. C.E.; and the contractors are Messrs. Underwood and Brother, of Dukinfield.


# PARAMOUNT FOR 1913 TRADE "PREMIER" COOKERS.

## SOME "PREMIER POINTS."



1. **NEW ARRANGEMENT OF TOP.**
   Improved design of TANGENT BURNERS set in most convenient positions.
2. **HINGED HOTPLATE.**
   Works on a self-locking principle.
3. **LARGE DOUBLE GRILL.**
   Separately controlled and easily worked with pan on runners.
4. **NO PROJECTING TAPS.**
   Gas Taps fixed well within cover of hotplate moulding.
5. **OVEN.**
   Enamelled; mottle inside and white tile pattern outside. Spacious and perfectly ventilated. Improved fittings, also spring catch to door.
6. **APPEARANCE.**
   Attractive addition to kitchen and easiest cooker to keep clean.

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**WILSONS & MATHIESONS, Ltd.,** CARLTON WORKS, ARMLEY, LEEDS

**Receiving Order against Water-Works Contractors.**—At the Burnley County Court a few days ago, a receiving order was made, on the petition of the creditors, against Messrs. Macdonald, Deakin, and Jones, the Contractors for the new reservoir at Hurstwood, near Burnley, which is in course of construction for the Burnley Corporation. The contract for the works was let to Messrs. Macdonald and Deakin, of London, for £158,000, in November, 1910; Mr. Jones being subsequently admitted a partner. Operations at the reservoir were suspended some weeks ago. The Corporation took possession, and are preparing to relet the work to be done. At the last meeting of the Town Council, it was stated that £37,000 had already been paid.

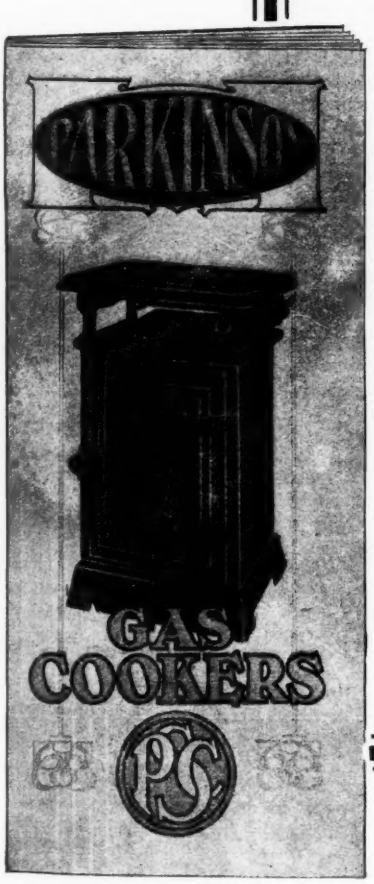
**The Death of a South Metropolitan Ambulance Man.**—An inquiry has been held into the circumstances attending the death of John William Hartwell, which occurred suddenly during a "first aid" competition by the ambulance men of the South Metropolitan Gas Company, as recorded in the "JOURNAL" last week (p. 619). Mr. Pasmore represented the Company, and evidence was given to the effect that everything possible was done for the unfortunate man. Dr. R. J. W. Oswald deposed that he was present at the competition. At 4.45 on the afternoon in question he was called to see Hartwell, who died in his presence. He had made an autopsy, and in the left pleural cavity he discovered an enormous clot of blood. He had never seen one so large. The other organs were fairly healthy. Death was due to syncope following hæmorrhage produced by rupture of pulmonary artery. A verdict of "Death from natural causes" was returned. Mr. Pasmore expressed the deep regret of the Company at the death of Hartwell, who had been in their employ for ten years, and was an excellent workman. He said the Company would do their best for the widow, who had three children dependent upon her.

**Atmospheric Pollution.**—At the meeting of the London County Council to-day, the General Purposes Committee will present a report on this subject. They state that the Committee for the Investigation of Atmospheric Pollution appointed at the International Exhibition and Conference held in London in 1912 have directed attention to the lack of co-ordinated effort in estimating the distribution of suspended matter in the air, and the absence of reliable data indicating the effect of smoke prevention in atmospheric purification and diminishing the frequency of fogs. They have suggested that such inquiries as that conducted by the "Lancet" in 1911 into the sootfall of London, Professor Cohen's well-known Leeds experiments, those of the Glasgow Corporation, and others of a similar nature, would have their value greatly increased if made on a co-ordinated plan instead of independently. Accordingly, the Committee are endeavouring to arrange for municipal authorities to co-operate in obtaining reliable and comparable observations as to the state of the atmosphere so far as suspended impurities are concerned. Among the Municipalities who have agreed to set up apparatus and take observations are those of Birmingham, Glasgow, Hull, Leeds, Newcastle-on-Tyne, Plymouth, and York; and the Committee recommend that the Council should co-operate in the investigation.

## APPLICATIONS FOR LETTERS PATENT.

11,623.—IRVING, E. C., and O'DONNELL, J. P., "Electrically operated valve." May 19.
11,634.—HUNT, E. J., and GIDDEN, W. T., "Treatment of sulphate liquors." May 19.
11,638.—ALTMAN, J., and the WHOLESALE FITTINGS COMPANY, LTD., "Air-regulators for burners." May 19.
11,647.—LUCAS, P., "Burners." May 19.
11,701.—MITCHELL, G. P., "Mantle lock." May 20.
11,711.—GMUROWSKI, A. C., "Mantles." May 20.
11,712.—ANDERSON, W., MEIKLE, J., and FULTON, C. W., "Gas-producers, retorts, &c." May 20.
11,728.—EDMUNDS, H. M., "Measuring the flow of fluids in pipes." May 20.
11,758.—HULTMAN, G. H., "Removing or recovering certain substances from coal gas." May 20.
11,819.—LINLEY AND CO., and OWENSMITH, W. H., "Argand burner." May 21.
11,846.—LANCASTER, E. W., "Cooking by gas." May 21.
11,956.—M'COURT, C. D., and BONECOURT SURFACE COMBUSTION, LTD., "Combustion of combustible mixtures." May 22.
11,957.—M'COURT, C. D., and BONECOURT SURFACE COMBUSTION, LTD., "Furnaces or other heating apparatus." May 22.
11,958-9.—M'COURT, C. D., and BONECOURT SURFACE COMBUSTION, LTD., "Generation of steam." May 22.
11,965.—FALK, S., "Burner regulators." May 22.
11,984.—ROSS, H. C., "Removing deleterious substances from tar, tar oils, or pitch." May 22.
11,992.—MADGE, W. T., and WARREN, F., "Burners." May 22.
12,000.—JONES, E. C., and PEARSON, J., "Gas-heaters." May 22.
12,001.—JONES, E. C., and PEARSON, J., "Igniters." May 22.
12,002.—JONES, E. C., and PEARSON, J., "Air and gas mixers." May 22.
12,046.—A. G., J. G., & A. G. SUTHERLAND, LTD., "Prepayment gas-meters." May 23.
12,058.—FONTAINE, D., "Gas-valve." May 23.
12,136.—DOWLING, F., and DU SANTOY, F. P., "Increasing the air or gas supply to compressors, engines, &c." May 24.

Last Wednesday, about eighty members and supporters of the Tunbridge Wells Tradesmen's Association paid an interesting and instructive visit to the borough and district water-works at Pembury, on the invitation of the Water Committee. The visitors were divided into two sections, and were conducted round the works by Alderman H. M. Caley and Mr. W. H. Maxwell (Borough Surveyor and Engineer), who explained in a lucid manner all the processes through which the water passes before it reaches the taps of the town. The afternoon's outing was concluded with tea on the lawn of the Camden Hotel.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**BIRMINGHAM & LONDON.**

PS

## GAS COMPANIES' STOCK AND SHARE LIST.

The Stock Exchange has had another depressed week, and all markets closed distinctly lower, to the general disappointment. For weeks past, the turn of things for the better was supposed to hang on the re-establishment of peace in the Near East. Now the end of the war has come, and has passed almost unnoticed. Other and equally strong factors have arisen; and markets are still falling. The mischief is not political but financial, and may be summarized as over-speculation in new issues. Enormous liabilities have been undertaken, the public has not rushed in to relieve, and the undertakers are hard pressed. Realizations have knocked prices to pieces. The opening day was really hopeful, though business was very quiet. The general tone was cheerful, and prices were buoyant. Gilt-edged were strong, and Consols rose ¼ for money and ⅛ for the account. Home rails showed advanced figures, and Americans were better, though not closing at the best. A change for the worse was apparent on Tuesday. The settlement was in preparation and caused some misgiving. Consols did not give way; but other departments generally were lower. Wednesday was sluggish, and the tone was dull and weak. Consols fell ⅛. Rails were all weaker, uncheered by good traffics; and Americans were lower. Thursday was equally depressed—continued realization putting prices down persistently. Consols receded another ¼; and all Government issues (except Indian) were down. Rails were freely offered, Americans zig-zagged and closed very ragged, and Foreign were depressed. Friday was just as dull; and even the signing of the Treaty of Peace could inspire no cheerfulness. Consols were ⅛ lower for money and Rails fell, though they steadied somewhat before the close. On Saturday, the tone was a little less gloomy in spite of the Allies' disagreements, and Rails were a shade better. Consols closed unchanged at 74½ to 74¾—a fall of ⅛ in the week. In the Money Market, there was a good demand; and rates for short loans and discount were firm. Business in the Gas Market was much reduced in point of activity. Out of the whole array of undertakings, only eight were dealt in at all, and some of these had but one transaction. Variations in quotations were very few and slight. In Gaslight and Coke issues, the ordinary was moderately dealt in, and prices showed hardly any change—transactions ranging from 102¼ to 103¼. In the secured issues, the maximum was done at 79 (a fall of 1), the preference at 94⅛ to 95⅜, and the debenture at 74⅛. South Metropolitan changed hands at 110; and ditto debenture at 73¼ to 74. In Commercials, the 4 per cent. marked 106 and 106½. Among the Suburban and Provincial group, there was one bargain in Alliance and Dublin at 70, and (on the local Exchange) one in Newcastle at 98½. In the Continental companies, Imperial realized from 165 to 168 (a fall of 1), Union 83, and European 17⅛ to 17¾. Among the undertakings of the remoter world, Primitiva was done at 6 to 6 3/16 (a fall of ¼), and ditto preference at 4⅞ to 5—a fall of 1/16.

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 1,551,868 | Stk. | April 11 | 6 | Alliance & Dublin Ord. | 70—73 | .. | 6 17 0 |
| 374,000 | ,, | Jan. 16 | 4 | Do. 4 p.c. Deb. | 84—87 | .. | 4 12 0 |
| 280,000 | 5 | April 11 | 7½ | Bombay, Ltd. | 6¼—6⅝ | .. | 5 11 1 |
| 50,000 | 10 | Feb. 27 | 15 | Bourne-mouth Gas and Water } 10 p.c. B 7 p.c. Pref. 6 p.c. | 28½—29½ / 15½—16¼ / 13½—14¼ | .. | 4 6 8 / 4 4 3 |
| 75,000 | 10 | ,, | 6 | | | | |
| 280,000 | Stk. | Feb. 27 | 14 | Brentford Consolidated | 260—265 | .. | 5 5 8 |
| 230,000 | ,, | ,, | 11 | Do. New | 200—205 | .. | 5 7 4 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 113—115 | .. | 4 6 11 |
| 206,250 | ,, | Dec. 12 | 4 | Do. 4 p.c. Deb. | 94—96 | .. | 4 3 4 |
| 217,380 | Stk. | Feb. 27 | 11 | Brighton & Hove Orig. | 206—211 | .. | 5 4 3 |
| 244,200 | ,, | ,, | 8 | Do. A Ord. Stk. | 151—154 | .. | 5 3 11 |
| 530,000 | 20 | Mar. 28 | 12½ | British | 45—46 | .. | 5 8 8 |
| 120,000 | Stk. | Dec. 30 | 4 | Do. 4 p.c. Deb. Stk. | 99—91 | .. | 4 7 11 |
| 245,771 | Stk. | ,, | 4 | Buenos Ayres 4 p.c. Deb. | 91½—93½ | .. | 4 5 7 |
| 100,000 | 10 | — | — | Cape Town & Dis., Ltd. | 2—3 | .. | — |
| 100,000 | 10 | — | — | Do. 4½ p.c. Pref. | 4—5 | .. | — |
| 100,000 | Stk. | Dec. 30 | 4½ | Do. 4½ p.c. Deb. Stk. | 78—83 | .. | 5 8 5 |
| 157,150 | Stk. | Feb. 13 | 5 | Chester 5 p.c. Ord. | 109½—111½ | .. | 4 9 8 |
| 1,513,280 | Stk. | Feb. 27 | 5/9/4 | Commercial 4 p.c. Stk. | 105—107 | .. | 5 2 1 |
| 560,000 | ,, | ,, | 5½ | Do. 3½ p.c. do. | 102—104 | .. | 5 2 6 |
| 475,000 | ,, | Dec. 12 | 3 | Do. 3 p.c. Deb. Stk. | 71—73 | .. | 4 2 2 |
| 800,000 | Stk. | ,, | 4 | Continental Union, Ltd. | 82—85 | .. | 4 14 2 |
| 200,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 130—132 | .. | 5 6 1 |
| 492,270 | Stk. | — | 5¾ | Derby Con. Stk. | 124—125 | .. | 4 12 0 |
| 55,000 | ,, | — | 4 | Do. Deb. Stk. | 103—105 | .. | 3 16 2 |
| 1,002,180 | 10 | Jan. 16 | 10 | European, Ltd. | 17½—18½ | .. | 5 8 1 |
| 16,415,840 | Stk. | Feb. 13 | 4/17/4 | Gas-light and Coke } 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. | 102—104 / 79—82 / 94—97 / 73—75 | .. / −1 / .. / .. | 4 13 9 / 4 5 4 / 4 2 6 / 4 0 0 |
| 2,600,000 | ,, | ,, | 3½ | | | | |
| 4,062,235 | ,, | ,, | 4 | | | | |
| 4,674,850 | ,, | Dec. 12 | 3 | | | | |
| 258,740 | Stk. | Mar. 13 | 5 | Hastings & St. L. 3½ p.c. | 89—91 | .. | 5 9 11 |
| 82,500 | ,, | .. | 6½ | Do. do. 5 p.c. | — | .. | — |
| 70,000 | 10 | April 25 | 11 | Hongkong & China, Ltd. | 17—17½ | +½ | 6 5 9 |
| 131,000 | Stk. | Mar. 13 | 7⅜ | Ilford A and C | 152—155 | .. | 4 18 4 |
| 66,780 | ,, | ,, | 6½ | Do. B | 120—122 | .. | 5 0 5 |
| 65,500 | ,, | Dec. 30 | 4 | Do. 4 p.c. Deb. | 89—91 | .. | 4 7 11 |
| 4,940,000 | Stk. | May 16 | 9 | Imperial Continental | 165—170 | −1 | 5 5 11 |
| 1,235,000 | Stk. | Feb. 13 | 3½ | Do. 3½ p.c. Deb. Red. | 85—87 | .. | 4 0 6 |
| 200,242 | Stk. | Mar. 13 | 6 | Lea Bridge Ord. 5 p.c. | 120—123 | .. | 4 17 7 |

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 551,000 | Stk. | Feb. 27 | 10 | Liverpool United A | 210—212 | .. | 4 14 4 |
| 718,100 | ,, | ,, | 7 | Do. B | 151—153 | .. | 4 11 6 |
| 306,083 | ,, | Dec. 30 | 4 | Do. Deb. Stk. | 98—100 | .. | 4 0 0 |
| 63,480 | Stk. | Jan. 16 | 3 | Maidstone 3 p.c. Deb. | 68—70 | .. | 4 5 9 |
| 75,000 | 5 | Nov. 28 | 6 | Malta & Mediterranean | 4⅜—5 | .. | 6 0 0 |
| 250,000 | 100 | April 1 | 4½ | Met. of Melbourne } 4½ p.c. Deb. | 98—100 | .. | 4 10 0 |
| 541,920 | 20 | May 30 | 4 | Monte Video, Ltd. | 12½—13* | .. | 6 3 1 |
| 1,775,892 | Stk. | Feb. 27 | 4½ | Newc'tle&G'tesh'd Con. | 98—99 | .. | 4 10 11 |
| 529,705 | Stk. | Dec. 30 | 3½ | Do. 3½ p.c. Deb. | 85—86 | .. | 4 1 5 |
| 55,940 | 10 | Feb. 27 | 7/7/0 | North Middlesex 7 p.c. | 13—14 | .. | 5 4 7 |
| 300,000 | Stk. | May 16 | 8 | Oriental, Ltd. | 124—129 | .. | 6 4 0 |
| 60,000 | 5 | Mar. 28 | 10 | Ottoman, Ltd. | 8—8½ | .. | 5 17 8 |
| 60,000 | 50 | Feb. 27 | 13 | Portsea, Island B | 125—128 | .. | 5 1 7 |
| 100,000 | 50 | ,, | 12 | Do. C | 122—125 | .. | 4 16 0 |
| 249,980 | 5 | May 16 | 8 | Primitiva Ord. | 5 13/16—6⅜ | −1/16 | 6 5 6 |
| 499,960 | 5 | Dec. 30 | 5 | ,, 5 p.c. Pref. | 4 13/16—5 1/16 | −1/16 | 4 18 9 |
| 521,600 | 100 | Dec. 2 | 4 | ,, 4 p.c. Deb. | 95—97 | .. | 4 1 8 |
| 346,198 | Stk. | Dec. 30 | 4 | River Plate 4 p.c. Deb. | 92—94 | .. | 4 5 1 |
| 275,000 | 5 | Apl. 11 | 12 | San Paulo, Ltd. | — | .. | — |
| 150,000 | 10 | ,, | 6 | Do. 6 p.c. Pref. | 11¼—11⅝ | .. | 5 2 2 |
| 125,000 | 50 | Jan. 2 | 5 | Do. 5 p.c. Deb. | 49—51 | .. | 4 18 0 |
| 135,000 | Stk. | Mar. 13 | 10 | Sheffield A | 225—227 | .. | 4 8 1 |
| 209,984 | ,, | ,, | 10 | Do. B | 225—227 | .. | 4 8 1 |
| 523,500 | ,, | ,, | 10 | Do. C | 225—227 | .. | 4 8 1 |
| 90,000 | 10 | May 30 | 7½ | South African | 9½—10½* | .. | 7 2 10 |
| 6,429,895 | Stk. | Feb. 13 | 5/9/4 | South Met., 4 p.c. Ord. | 110—112 | .. | 4 17 7 |
| 1,895,445 | ,, | Jan. 16 | 3 | Do. 3 p.c. Deb. | 73—75 | .. | 4 0 0 |
| 209,820 | Stk. | Feb. 27 | 8½ | South Shields Con. Stk. | 161—163 | .. | 5 4 4 |
| 952,795 | Stk. | Feb. 27 | 6 | S'th Suburb'n Ord. 5 p.c. | 117—119 | .. | 5 0 10 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 115—117 | .. | 4 5 6 |
| 117,058 | ,, | Dec. 30 | 5 | Do. 5 p.c. Deb. Stk. | 117—119 | .. | 4 4 0 |
| 594,740 | Stk. | May 16 | 5 | Southampton Ord. | 100—103 | .. | 4 17 1 |
| 120,000 | Stk. | Feb. 13 | 7½ | Tottenham and } A 5 p.c. B 3½ p.c. | 139—142 / 115—117 | .. / .. | 5 2 1 / 4 18 3 |
| 483,940 | ,, | ,, | 5½ | | | | |
| 149,470 | ,, | Dec. 30 | 4 | Edmonton 4 p.c. Deb. | 92—94 | .. | 4 5 1 |
| 182,380 | 10 | ,, | 5 | Tuscan, Ltd. | 5—6 | .. | 8 6 8 |
| 149,900 | 10 | Jan. 2 | 5 | Do. 5 p.c. Deb. Red. | 96½—98½ | .. | 5 1 6 |
| 236,476 | Stk. | Feb. 27 | 5 | Tynemouth, 5 p.c. max. | 114—115 | .. | 4 6 11 |
| 255,636 | Stk. | Mar. 13 | 6⅞ | Wands-worth B 3½ p.c. 3 p.c. Deb. Stk. | 137—140 / 68—70 | .. / .. | 4 18 2 / 4 5 9 |
| 88,416 | ,, | Dec. 30 | 3 | | | | |

Prices marked * are "Ex-Div."

## WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

### Appointments, &c., Vacant.

LADY DEMONSTRATOR. 5743.
GAS METER MAKERS AND REPAIRERS. Portsea Island Gas Company. Applications by June 11.
JUNIOR CLERK AND COLLECTOR. Skegness Gas Company.
JUNIOR DRAUGHTSMAN. Keighley Gas Department. Applications by June 10.
ENGINEER AND MANAGER. Northwich Gas Company. Applications by June 14.
DRAUGHTSMAN. Newton, Chambers, and Co., Thorncliffe Iron Works.
CHEMICAL PLUMBER. Staveley Coal and Iron Company.

### Appointments, &c., Wanted.

CHEMICAL PLUMBER. Davies, Galloway Road, Shepherd's Bush, W.

### Plant, &c. (Second Hand), for Sale.

CONDENSERS (ANNULAR). Yorktown and Blackwater Gas Company.
EXHAUSTER AND STEAM-ENGINE. Joseph Hawksley, Great Yarmouth.
PURIFIERS, WASHER, EXHAUSTERS. South Suburban Gas-Works.
VALVES. No. 5744.
WASHER, STEAM-ENGINE, &c. Peterborough Gas Company.

### Sales of Stocks and Shares.

BOMBAY GAS COMPANY. London Mart. June 17.
BRENTFORD GAS COMPANY. London Mart. June 24.
BRIGHTON GAS COMPANY. London Mart. June 24.
BRITISH GASLIGHT COMPANY. London Mart. June 24.
CAPE TOWN GAS COMPANY. London Mart. June 17.
EUROPEAN GAS COMPANY. London Mart. June 24.
GRAYS AND TILBURY GAS CO. London Mart. June 17.
ILFORD GAS COMPANY. London Mart. June 24.
LOWESTOFT WATER AND GAS COMPANY. London Mart. June 17.
NORTH MIDDLESEX GAS COMPANY. By Tender June 7. London Mart June 24.
ORIENTAL GAS COMPANY. London Mart. June 17.
PRIMITIVA GAS COMPANY. LondonMart. June 17.
SOUTH AFRICAN LIGHTING ASSOCIATION. London Mart. June 24.
SOUTH BARRACAS GAS CO. London Mart. June 17.
SOUTH SUBURBAN GAS CO. London Mart. June 24.
TOTTENHAM GAS COMPANY. London Mart. June 24.

### TENDERS FOR

### Coal.

ATHERTON URBAN DISTRICT COUNCIL. Tenders by June 11.
CHESTER GAS COMPANY. Tenders by June 9.
CHORLEY GAS DEPARTMENT. Tenders by June 10.
CLITHEROE GAS DEPARTMENT. Tenders by June 11.
DEWSBURY GAS DEPARTMENT. Tenders by June 14.
ELSECAR, &c., GAS COMPANY. Tenders by June 9.
NORTHWICH GAS COMPANY. Tenders by June 12.
PETERBOROUGH GAS COMPANY. Tenders by June 7.

### Coal—*continued.*

SAFFRON WALDEN TOWN COUNCIL. Tenders by June 21.
SALISBURY GAS COMPANY. Tenders by June 9.
SPALDING GAS DEPARTMENT. Tenders by June 11.
SUNBURY GAS COMPANY. Tenders by June 19.
WORKSOP GAS COMPANY. Tenders by June 12.

### General Stores (Main Taps, Castings, Lime, Vitriol, Flexible Tube, Fire Cement, Lead Pipe, Oils, Paints, Yarn, &c.)

KEIGHLEY GAS DEPARTMENT. Tenders by June 9.
NORTHWICH GAS COMPANY. Tenders by June 14.

### Mantles.

NORTHWICH GAS COMPANY. Tenders by June 14.

### Oxide.

KEIGHLEY GAS DEPARTMENT. Tenders by June 9.

### Pipes, &c.

NORTHWICH GAS COMPANY. Tenders by June 14.

### Tar and Liquor.

ATHERTON URBAN DISTRICT COUNCIL. Tenders by June 11.
MACCLESFIELD GAS DEPARTMENT. Tenders by June 14.
NORTHWICH GAS COMPANY. Tenders by June 14.
READING GAS COMPANY. Tenders by June 16.